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132
PAGES!

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GEAR

### GAMING LAPTOPS HEAD TO HEAD

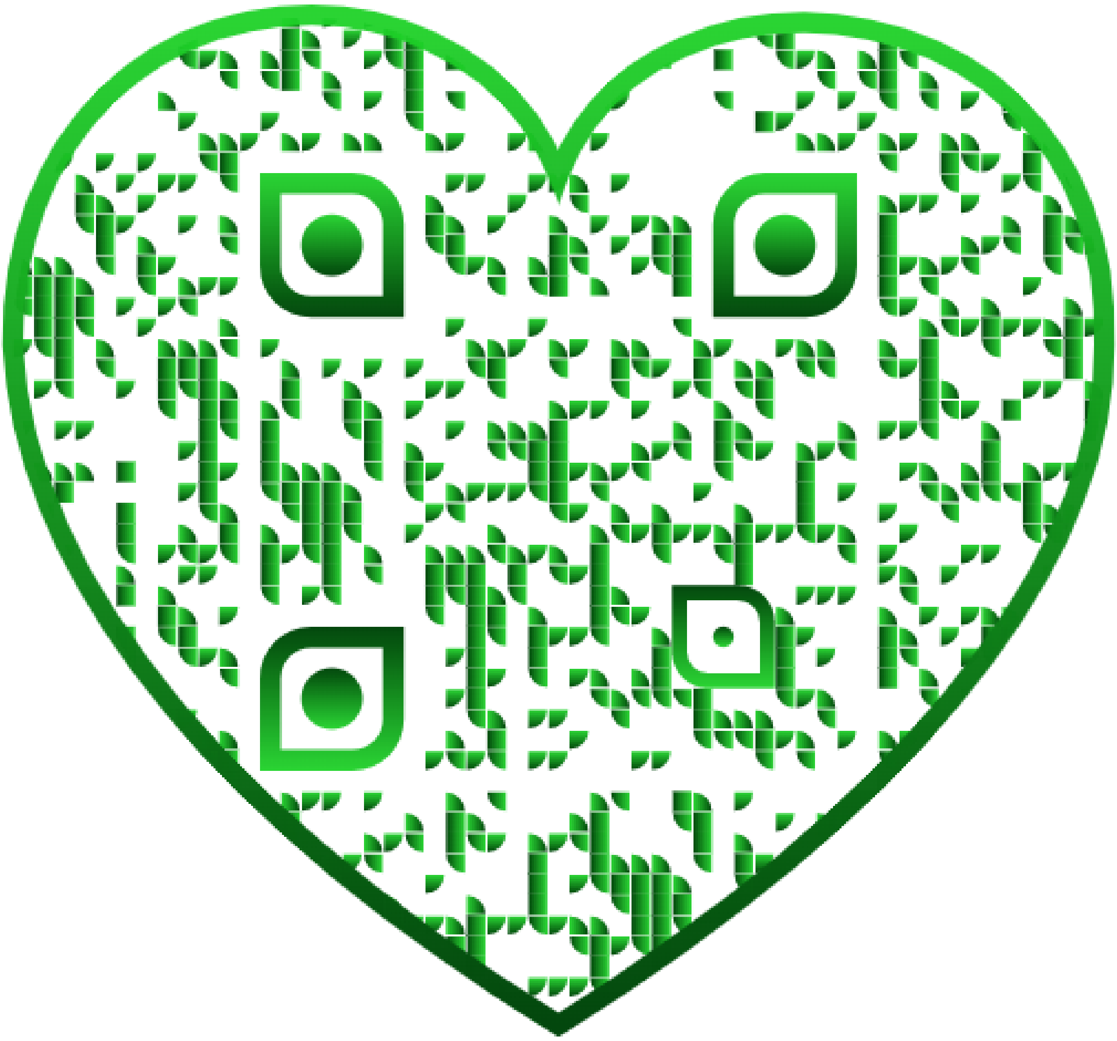
GROUP TEST

### BEST PHONE READER APPS

GAMING

### BATTLEFIELD 6

IS THIS THE BEST SHOOTER OF THE YEAR? *APC* VERDICT INSIDE



# Vigor2865L-5G Series

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- 5G Max. Data Rate NR NSA: 3.4Gbps (DL) / 550Mbps (UL)
- Multi-WAN with 1 x VDSL2 35b modem, 1 x configurable GbE WAN/LAN port, 1 x USB port, 2 x 5G/4G LTE nano SIM slots, and 2 x Wi-Fi WANs for Lax-5G model
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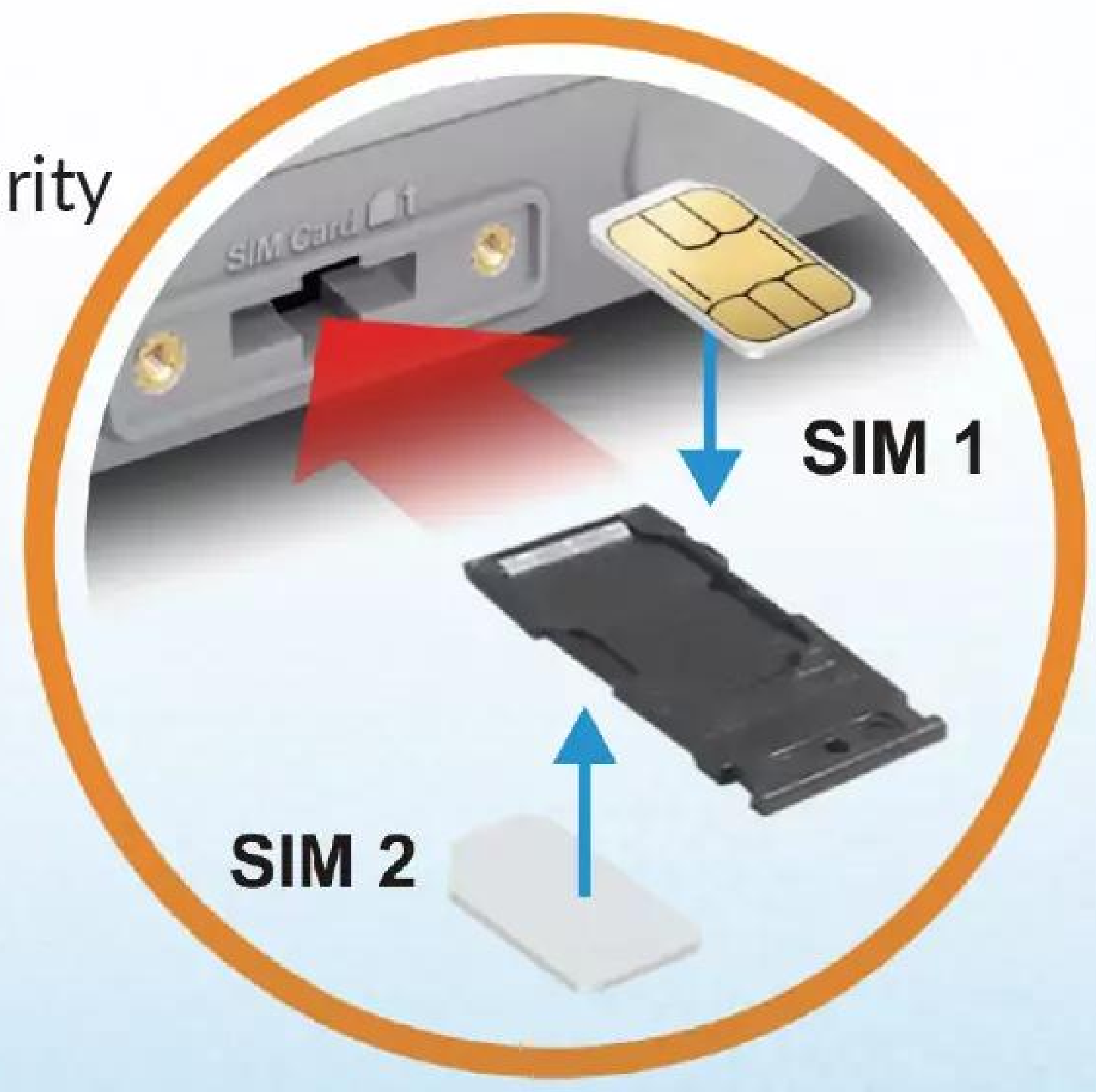
- Central Switch Management for up to 10 VigorSwitches
- 2 years back to base warranty



**Typical 5G Downlink/Uplink speeds are 400Mbps/200Mbps, depending on the local conditions.

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# Don't let the hackers attack

## It's not hard to keep your data safe.

**Hi everyone. Welcome to the it's-almost-Christmas issue. Yep, I can't believe how fast this year's gone, either. We've had a lot of interesting things to pay attention to this year, leaving not much time to watch the minutes pass on the clock, though I suspect AI is somehow also to blame. Somehow.**

I hope your Windows 10 EOL experience has gone smoothly, and that *APC* prepared you in good time to consider all of your options. Thankfully that's all behind us now, and if I may say, this seems like a great time to suggest that you keep your old issues of *APC*, just in case you need to go back and reference one of our guides if you've dawdled just a bit on actioning the big EOL kerfuffle.

Speaking of subscribing. Well, we weren't, but let's. if you buy *APC* via a shop or newsagent you'll probably have noticed the small price rise. We're sorry we had to do that, but I promise it was unavoidable as printing and distribution costs have gone up over the years since we last had to change our cover price. Subscribers, though, keep the same low price as before, so if I may humbly suggest, this is the best way to get *APC*. Plus you won't miss a copy and when you finally do need to check our older guides, well, they'll be right there all ready to read.

In this issue we've got two important security features that you'll also want to keep. Password managers are absolutely essential today. I follow cybercrime closely and the number of attacks is growing, with stolen, hacked or just cleverly guessed passwords being the biggest cause of these data thefts. Please, don't risk it. Many good ones are free or ridiculously cheap, and they're easy to set up too. We've taken a close look at the main players in our feature on page 52 and whittled it down to just three we'd recommend out of a field of 20. I urge you to follow our advice here. The day a criminal has access to your accounts and personal info is a very bad day indeed.

Plus we also show you how to scrub all your personal data from old devices before you sell them, give them away or dispose of them. Also extremely important!

I hope you all have a great month, and we'll see you again before the year ticks over. ■

**HOT TAKES**

**"AI washing: Marketing your product as having AI when it doesn't really, or only in a limited way. You know how every company claims to be AI native or AI first these days? That. See also: GPT-washing, jumping on the bandwagon, AI hype, every day since ChatGPT arrived."**
Glossary of the future. Page 20

**"There's more than one way to enjoy a Battlefield game's visuals, and I'd argue the best way of all is to put the guns down entirely and embrace spectator mode."**
Tech Tales. Page 118

**"I'm not suggesting that Intel is betting the farm on Panther Lake, but the combine harvester and outhouse are definitely up for grabs."**
Best of IFA 2025. Page 47

**"In the weeks I've been using the Pixel 10 Pro I haven't regretted my purchase once. Everything works smoothly and solidly."**
Review. Page 34

# Exclusive downloads

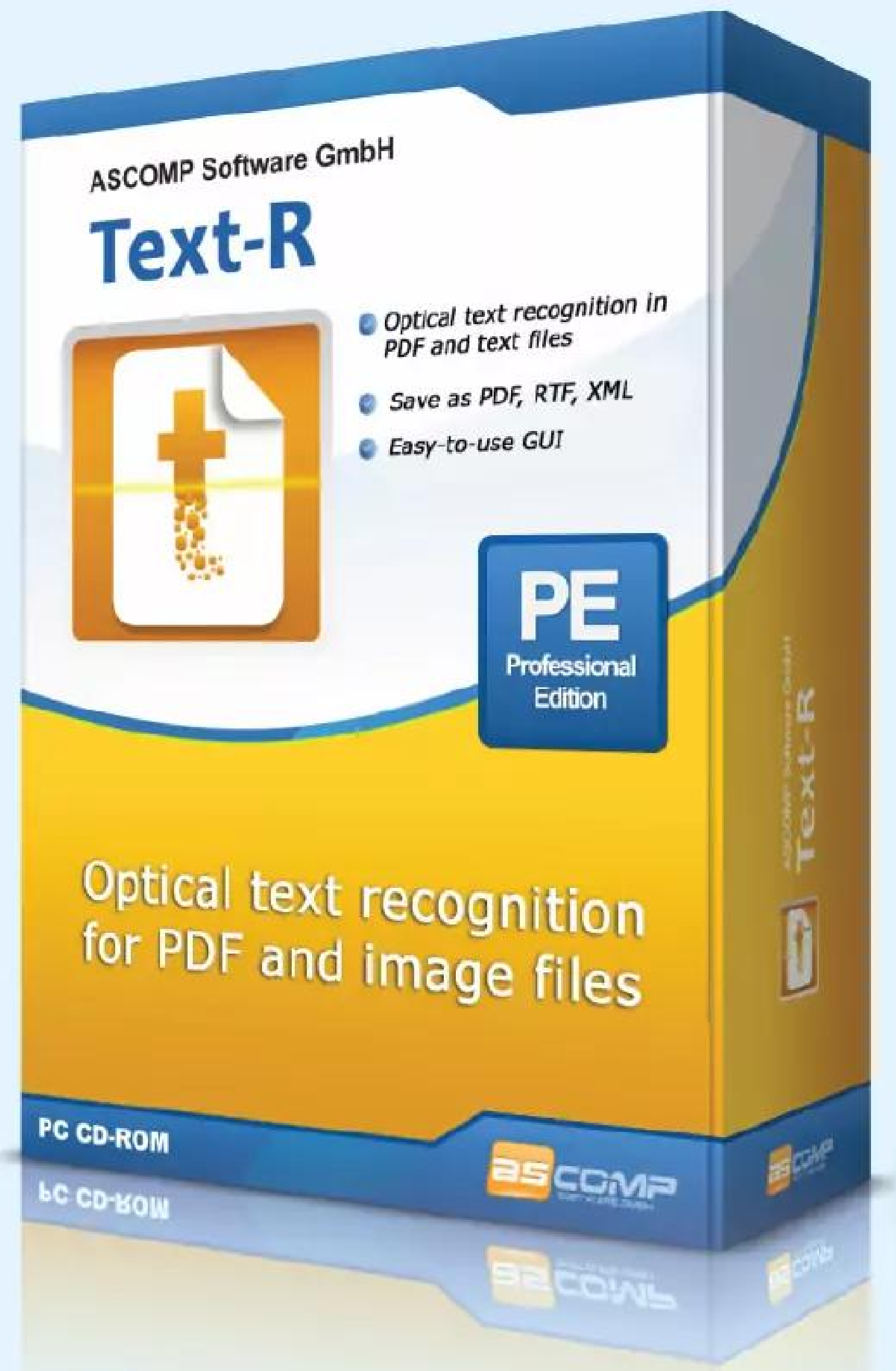
Your free full-version apps as a thanks for reading *APC*. These exclusive downloads will only be available for a limited time, from 17/11/25 to 04/01/26.

**Download these *APC* exclusives free from: www.apcmag.com/exclusives**

## AUDIALS MUSIC 2025.3 SE

SIMPLE MUSIC RECORDING.

Thanks to the enormous range of music available on video portals such as YouTube or Vimeo, users can discover almost any song or music video. Instead of taking up hard disk space with downloaded files, this content can be added to playlists using simple links. This creates a personal, always accessible music collection that remains flexible and storage-free without compromising on quality or variety. Current and popular chart hits can be downloaded as files. This allows you to listen to your favourite songs offline, regardless of an internet connection. No matter which streaming service or source on the Internet – find and save any piece of music in many versions and convert songs into all formats and play them on other devices.



## ASCOMP TEXT-R

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## ASHAMPOO SNAP 15

ALL-PURPOSE FLEXIBLE SCREEN AND VIDEO CAPTURES FOR WINDOWS PCS.

Ashampoo Snap 15 captures anything you see on your screen as images or videos. Aside from regular screenshots, the program also supports timed captures, scrolling areas, custom window sizes and multi-display environments. Multiple postprocessing features help you augment your screen captures with graphics, texts and effects to convey a lot of information quickly and visually. From webinar recordings to individual tutorials to illustrated explanations: Ashampoo Snap 15 is your fast route to success. Comfort features, automated numbering or dedicated postprocessing tools, save you time and effort. Finished captures can be stored locally or uploaded to Ashampoo cloud space. Snap's built-in video editor is perfect to make custom cuts and freely merge, or store, clips as individual episodes.

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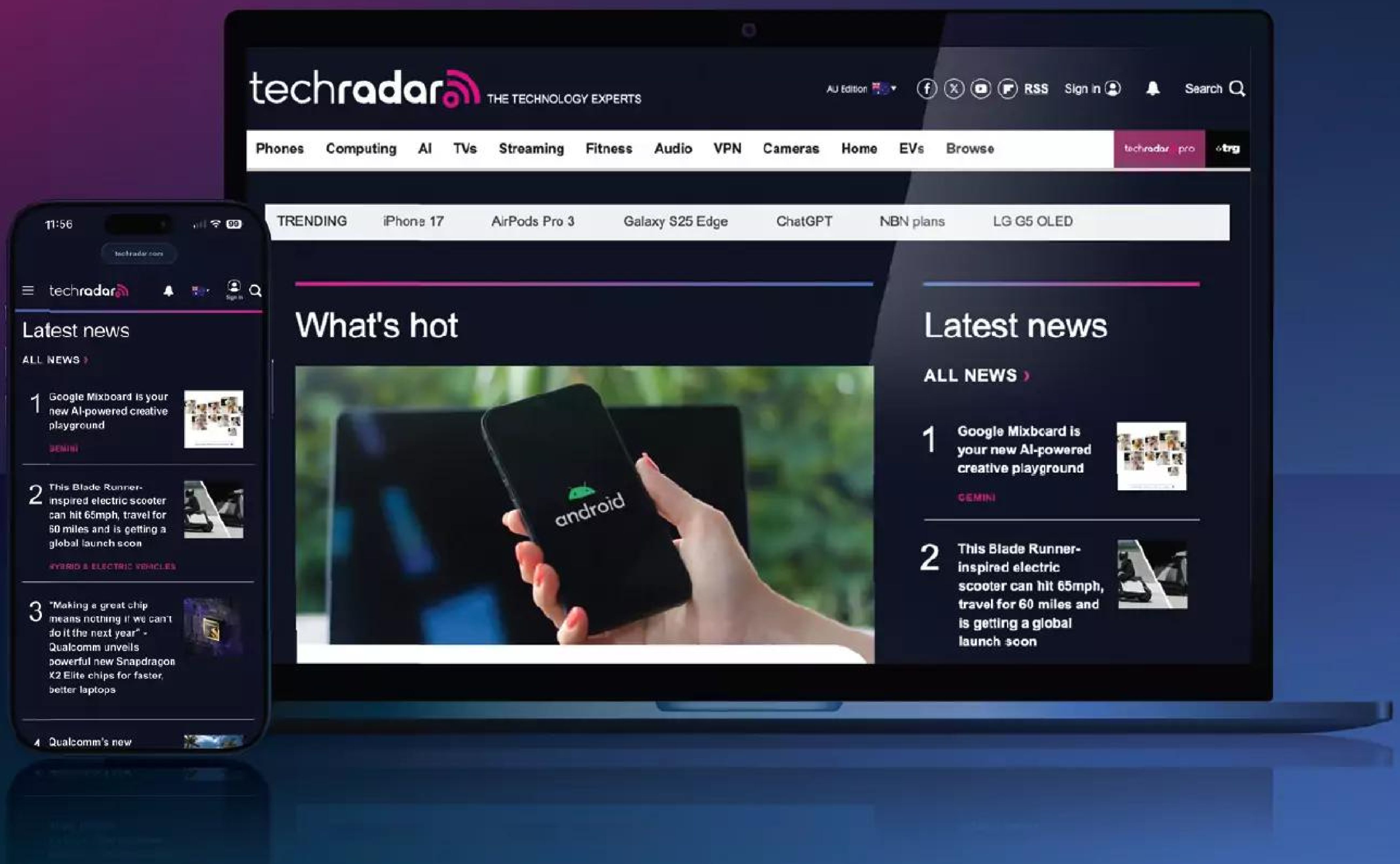
Product testing for the real world

You need to know that the device or service you're about to spend money on works as advertised - and that it works in the real world.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HYBRID & ELECTRIC VEHICLES

1 Google Mixboard is your new AI-powered creative playground

2 This Blade Runner-inspired electric scooter can hit 65mph, travel for 60 miles and is getting a global launch soon

3 "Making a great chip means nothing if we can't do it the next year" - Qualcomm unveils powerful new Snapdragon X2 Elite chips for faster, better laptops

4 Qualcomm's new

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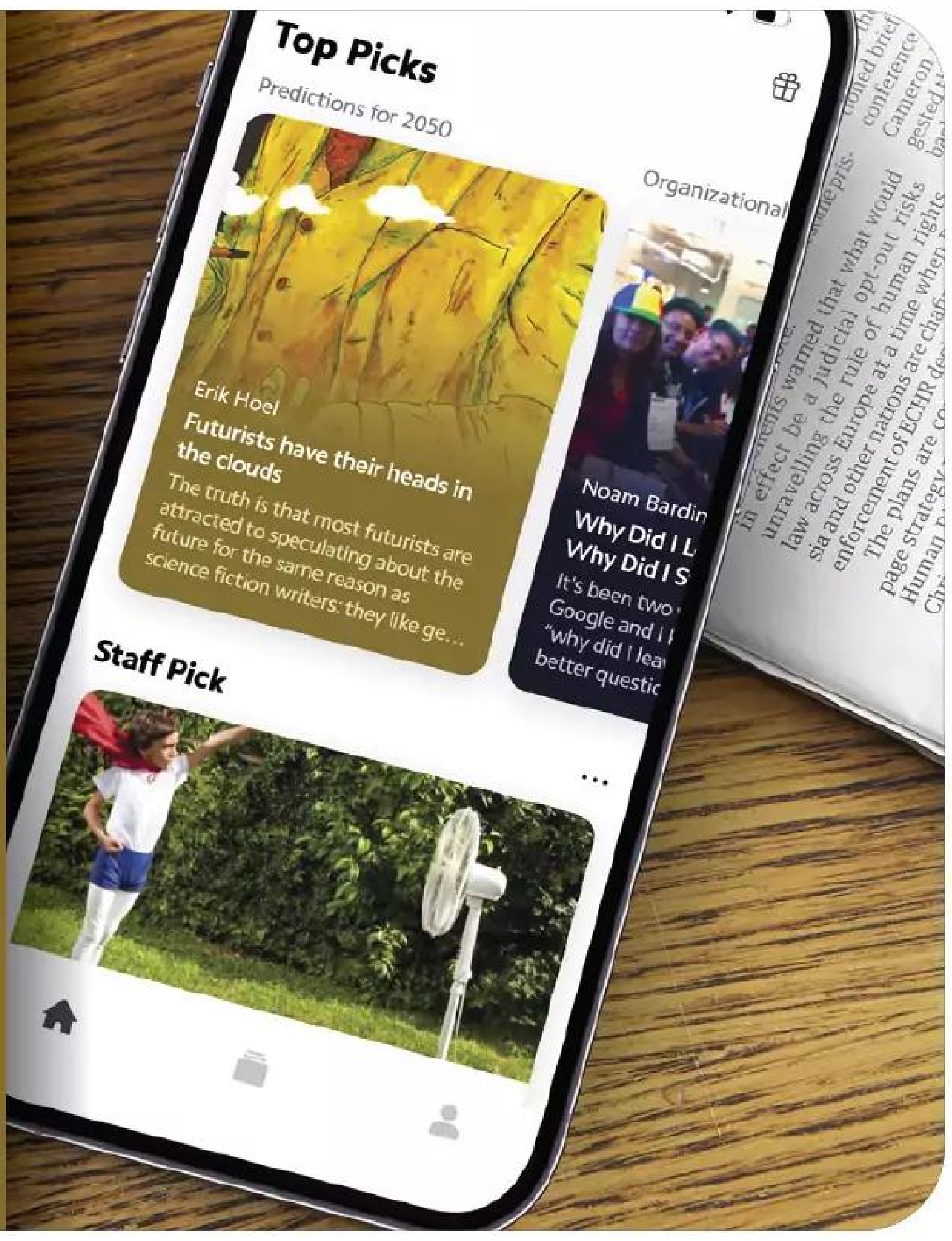
**6 best reader apps**

Pocket alternatives for the discerning reader.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**Erase all your data**

Don't discard your devices without securely erasing their data first. Barry Collins reveals how to wipe a wide range of tech.

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# TECHNOTES

Everything you need to know from the month in tech

ProEnergy

## JET ENGINE SHORTAGES THREATEN AI DATA CENTRE EXPANSION

**Hyperscalers race to buy every jet engine they can find.**

Faced with multi-year delays to secure energy grid connections, data centre developers have been racing to bolt ex-airliner turbine cores onto mobile generator trailers. These so-called aeroderivative gas turbines, long used in military and offshore energy, are now being ordered in bulk to deliver fast-start bridging power for hyperscale AI clusters, which face a deepening energy crunch. But the supply is running out.

Siemens Energy said this year that more than 60% of its US gas turbine orders are now linked to AI data centres. GE Vernova is currently quoting 2028 or later for new industrial units, while Mitsubishi warns new turbine blocks ordered now may not ship until the 2030s. One company reportedly paid $25 million to reserve future delivery.

## SYNOLOGY WALKS BACK CONTROVERSIAL POLICY

**Has removed restrictions on third-party drives.**

Synology has backtracked on its controversial self-branded drives-only policy, restoring the ability to use third-party and certified HDDs and SSDs on its 2025 Plus series NAS units. With the launch of its latest DiskStation Manager 7.3, users can once again use hard drives and SSDs from brands like Western Digital and Seagate, without losing out on features.

Earlier this year, the company had restricted core functionality for third-party and non-certified drives, including support for storage pools, health monitoring and firmware updates. The company made Synology-branded and certified drives compulsory, claiming that users would benefit from higher performance, increased reliability, and more efficient support.

# Microsoft facing huge lawsuit over unfair software pricing

As many as 2.7 million Australian Microsoft 365 users could be affected.

**Microsoft is being sued by the Australian consumer watchdog for allegedly misleading millions of users regarding its Microsoft 365 platform. The Australian Competition & Consumer Commission (ACCC) says the company advised users stick to an auto-renewal deal on their Microsoft 365 package, despite cheaper or more useful offers being available.**

As many as 2.7 million users of Microsoft 365 Personal and Family plans could have been affected, and could now be in for a share of a payout if the case is successful.

The ACCC complaint alleges Microsoft failed to offer appropriate advice to users after adding its Copilot AI platform into the 365 platform in Australia back in October 2024. Users with a Microsoft 365 Personal of Family plan were allegedly told this integration of Copilot would mean they would have to pay a higher price if they wanted to keep their existing subscription.

However in its complaint, the ACCC says Microsoft provided users with “false or misleading” information, because there was an undisclosed third option – the Microsoft 365 Personal or Family Classic plans, which allowed subscribers to retain the features of their existing plan, without Copilot, at the previous lower price.

The ACCC notes the company did send out two emails and published a blog post informing auto-renewal subscribers of the new integration, including information on the price prices – but apparently failed to mention alternative plans were available, and the users themselves would have no way of discovering their existence unless they actively started the process of cancelling their subscription.

The complaint notes that these were not small price rises either – as the annual subscription price of the Microsoft 365 Personal plan increased by 45% from $109 to $159, and the Microsoft 365 Family plan increased by 29% from $139 to $179.

“The Microsoft Office apps included in 365 subscriptions are essential in many people’s lives and given there are limited substitutes to the bundled package, cancelling the subscription is a decision many would not make lightly,” ACCC Chair Gina Cass-Gottlieb said.

The ACCC says it is seeking orders “including penalties, injunctions, declarations, consumer redress, and costs”, and notes the maximum penalty for each breach of the Australian Consumer Law is above $50 million.

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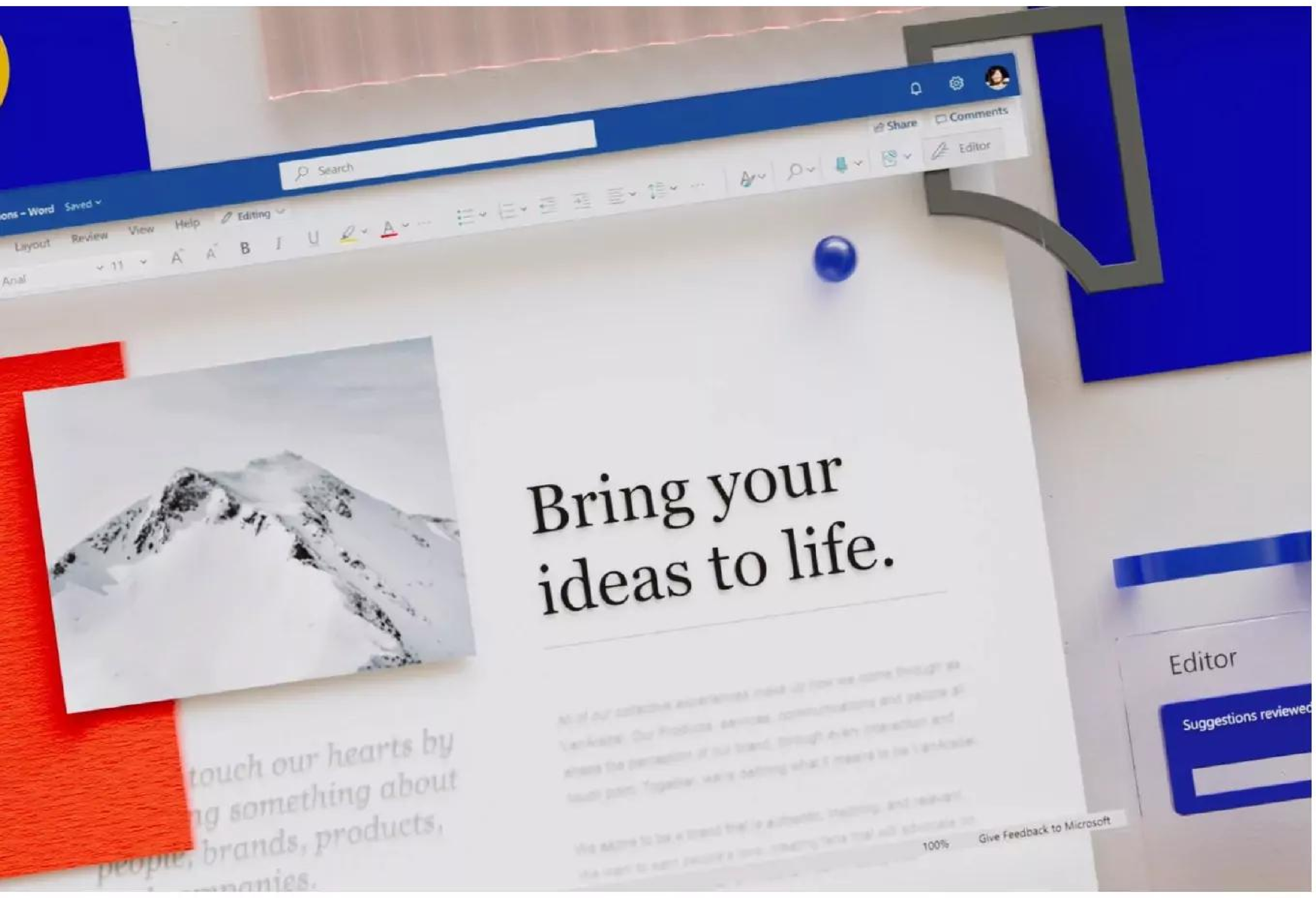


Microsoft

# Word is changing forever

## Your new documents will now live in the cloud by default.

Microsoft is soon making changes to Word that might ruffle some feathers. “Starting today, new documents in Word desktop on Windows (Insiders) now save directly to OneDrive, with autosave enabled,” says Microsoft. This means that creating new documents in Word in the future will automatically save said documents to your OneDrive storage, with autosave enabled from the get-go.

The change is designed to make it easier for users to back up and access their documents across devices, but some might find Word attempting to automatically upload documents to the cloud by default to be a privacy concern.

Users will be able to turn off this behaviour if they prefer saving files manually or locally, but going forward, Word will default to automatically saving all new documents to the cloud.

## MICROSOFT REVEALS PLAN TO ‘MAKE EVERY WINDOWS 11 PC AN AI PC’

**With new voice input, Copilot Vision and supercharged AI powers.**

In new updates, Microsoft is focusing on further integrating AI into Windows 11 apps and experiences (not just chatbots), and making voice as much of an input option as the keyboard and mouse.

The idea, Microsoft says, is that AI on a PC should be easy and natural to interact with in either text or voice; that it should be able to see your screen and information and help; and that it should be able, with your permission, to “take action on your behalf.”

You will be able to talk to Microsoft’s Copilot AI by invoking a “Hey, Copilot” wake word, or use the established Win+C shortcut or Copilot button. With your permission, Copilot will be able to see your screen and make suggestions or provide help.

In example videos, we saw someone talk to Copilot in a music player app, and the AI walked the user through steps to get the best sound quality. In another, someone watched a YouTube video and asked Copilot to identify the microphone the host was using, and then the AI pointed out that Best Buy had it available for sale.

Microsoft

## QUALCOMM ACQUIRES ARDUINO

**Surprise move puts it at the helm of huge maker community.**

In an unexpected announcement, Qualcomm has revealed plans to acquire Arduino, the open-source hardware and software company behind the popular microcontroller boards. The deal, which is subject to regulatory approval, will help Qualcomm expand its reach into the global developer community and boost its position in edge and AI computing.

Arduino, which currently has more than 33 million active users worldwide, will retain its brand and continue supporting a wide range of microcontrollers from different chipmakers.

The acquisition will pair Arduino’s open-source approach with Qualcomm’s processing, graphics, and AI capabilities, with the aim of simplifying development across education, industry, and research.

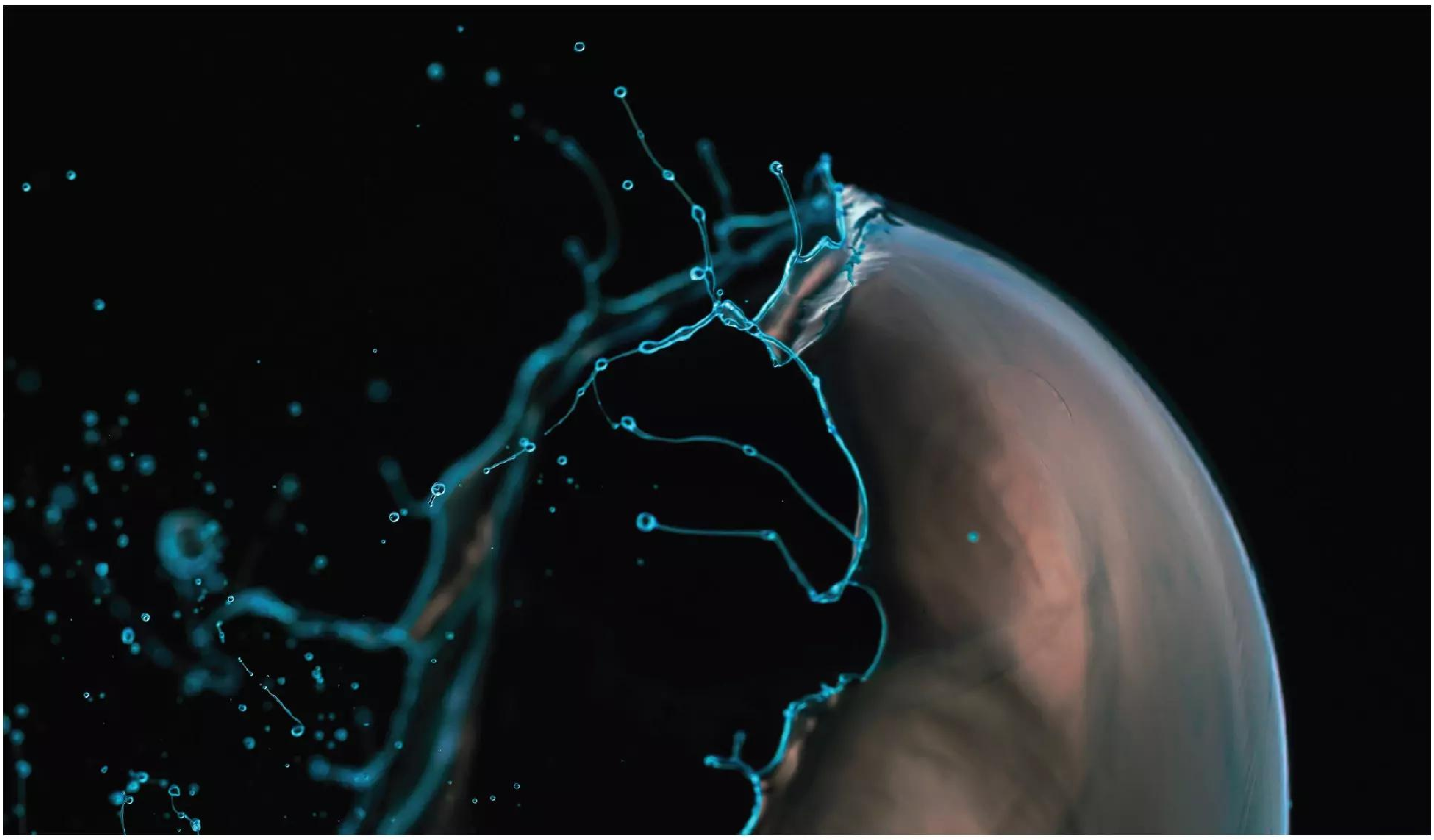
Shanghai Hailanyun Technology

## CHINA DEPLOYS WIND-POWERED UNDERWATER DATA CENTRE

**New project dunks server pods beneath the waves.**

China has launched what it claims is the world’s first wind-powered undersea data centre – a sealed, seawater-cooled cluster sitting 35 meters beneath the surface off the coast of Shanghai. The $226 million project, located in the Lin-gang Special Area near the city’s southern tip, is pitched as the prototype for a new kind of energy-efficient, land-sparing cloud infrastructure.

The project is designed to reach 24-megawatts in its full build. The Lin-gang zone says its targets include keeping cooling power under 10% of the total draw and feeding the entire system with offshore wind. On paper, this leads to a near-zero footprint data centre that requires no freshwater or grid connection, with 95% percent of its electricity coming from offshore wind.



© Getty

# Is the AI bubble about to pop?

Fears are growing that the AI bubble might be on the brink of bursting. Barry Collins weighs up what could go wrong.

**If you've been smiling quietly to yourself every time you looked at your superannuation statement over the past couple of years, you've probably got AI to thank for the cushier retirement. For now, at least.**

The AI bubble is continuing to inflate at a rapid rate. In 2024, generative AI companies raised $56 billion from venture capitalists – close to double the figure from 2023, according to financial database PitchBook. In the first quarter of 2025 alone, AI startups secured $73.1 billion.

> "Much of this growth is a bet on the future. A bet that all these chips, all these new data centres, all these AI services will drive enormous future revenues."

The reason that your pension pot has been growing faster than Japanese knotweed is that many funds are tied to the fortunes of the "Magnificent Seven" – a collection of AI-linked companies that are lifting the broader market (see right). Nvidia alone is now worth more than $4 trillion.

Much of this growth is a bet on the future. A bet that all these chips, all these new data centres, all these AI services will drive enormous future revenues. Far more than they're doing currently. But if they don't, if AI doesn't become the irreplaceable workplace assistant it's being sold as, there's an awful lot of capital tied up in those soon-to-be-redundant data centres. If AI fails to live up to its hype, some predict it will make the dotcom crash look like a rounding error.

## REASONS TO BE FEARFUL

What should give you pause for thought before flicking through the Bentley catalogues? Well, there are more than a few signs that the AI hype is overcooked.

First is the extraordinary way those Magnificent Seven companies – Alphabet, Apple, Amazon, Meta, Microsoft, Nvidia and Tesla – have outperformed the rest of the market. During 2023-24, the weighted average share price of those seven firms rose by 156%, while the other 493 firms in the S&P 500 saw an increase of only 25%. America's stock market is largely riding on the fortunes of AI.

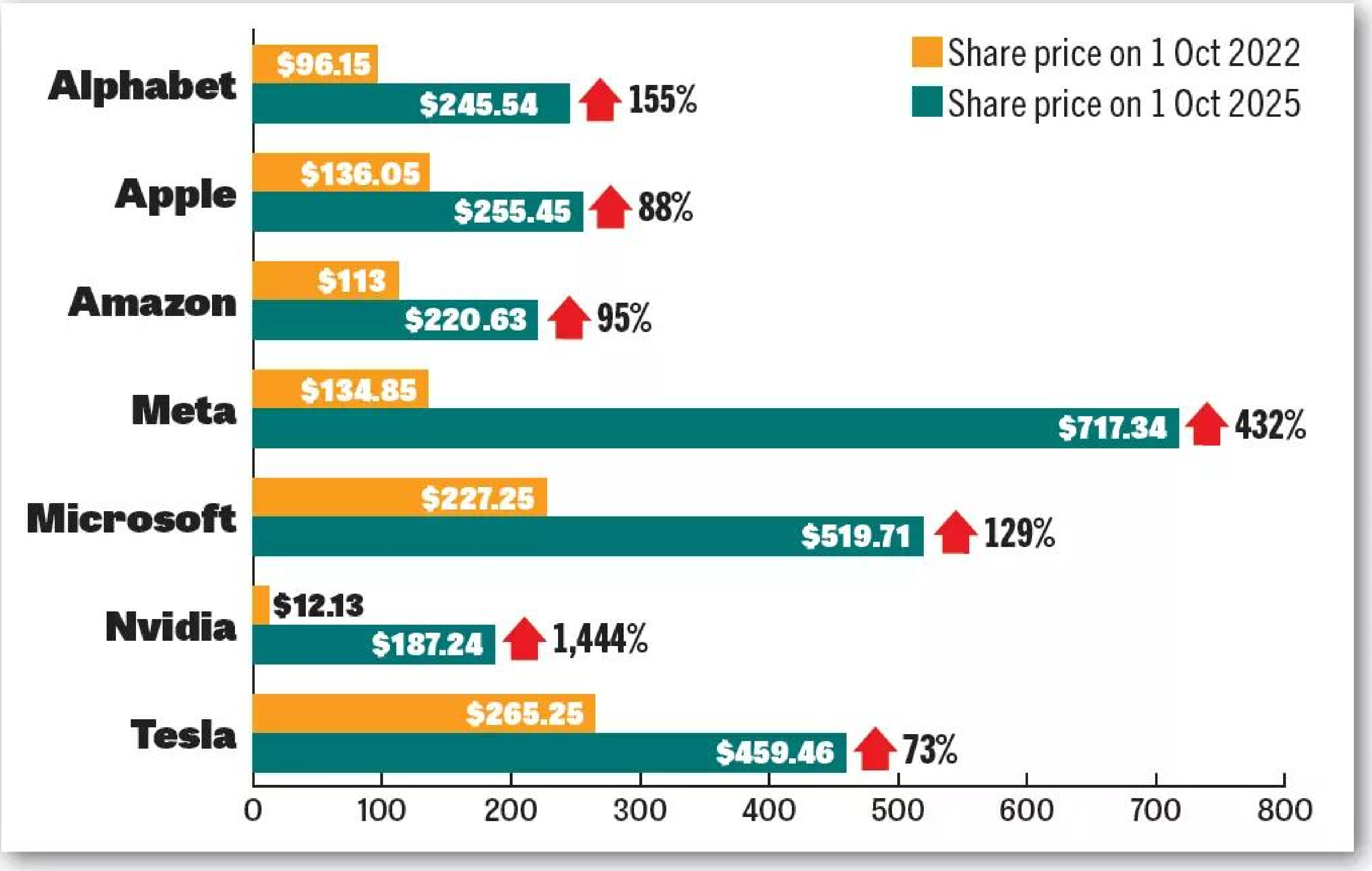
While there are signs of the rapid acceleration slowing this year – Nvidia's price/earnings (p/e) ratio is down to 48 in September 2025, a sharp fall from a huge peak of 230 in 2023 – it's still miles over historical averages. The FTSE 100 has an average p/e ratio of around 15. Oracle, which recently announced a massive deal with OpenAI, has a p/e ratio hovering around the high sixties. Investors are still gambling much harder on AI than conventional wisdom would suggest is wise.

Then there's the inter-dependency of these firms to consider. Oracle's share price shot up because it inked a five-year deal with OpenAI reportedly worth $300 billion. OpenAI doesn't have

## The rise of the Magnificent Seven

How much have the fortunes of the AI-related tech giants improved since the advent of AI? We're comparing the share prices of the seven companies involved between 1 October 2022 – a month before ChatGPT launched – to 1 October this year. Even though every one of the seven has performed well over the three-year period, there are still clear winners. Nvidia chief among them, having seen its share price increase in value by close to 1,500%, but with Alphabet, Meta and Microsoft also showing triple-figure growth.

To put that in perspective, if you'd invested $10,000 in Nvidia back in October 2022, you'd now be sitting on a shareholding worth around $154,400 at the time of writing.



$300 billion in its coffers, but some reports suggest Nvidia will invest up to $100 billion in OpenAI over the next few years, adding to smaller previous investments. The AI infrastructure Oracle will be building for OpenAI will inevitably involve Nvidia hardware, and so the money flows back and forth around these three companies, raising concerns about how mutually dependent the fortunes of these massive players are. And what would happen should one stumble.

For some, it's a worrying echo of the dotcom bubble bursting at the turn of the millennium, when telecoms companies lent money to their customers. "It's not quite like what many of the telecom suppliers were up to in 1999-2000 but it has certain rhymes to it," Investor James Anderson, managing partner of Lingotto's innovation strategy fund, told *The Guardian* recently. "I don't think it makes me feel entirely comfortable from that point of view."

The other big risk is that customers don't see the benefits of deploying AI that will keep them spending big sums on the technology in the future. There's already some early evidence that the companies that have deployed generative AI aren't seeing a financial return. An MIT report published in July found that "despite $30-40 billion in enterprise investment into GenAI, this report uncovers a surprising result in that 95% of organisations are getting zero return".

However, once you get past that alarming headline finding, the report suggests that the reasons most early adopters are struggling to see a return is because it's not being used where it could really make a difference. Over 80% of firms have tried tools such as ChatGPT or Copilot, rather than invest in AI that fits into their current workflows. Around 70% of those GenAI budgets went into departments such as sales and marketing, where returns are easy to measure, instead of into areas such as back-office automation where AI could make a real difference, the report claimed.

### WAITING FOR THE RETURNS

IDC president Crawford Del Prete acknowledges that companies failing to get a return from their AI deployments is "one of the most significant risks" of the AI bubble bursting. But he says it's wrong to judge the success of AI on how well, say, ChatGPT goes down in businesses.

"I would argue this is multifaceted," he told *APC*. "It's also going to be how well does SAP, for example, Salesforce, Workday – all these SaaS vendors – integrate AI into their applications."

"It's the entire IT industry being able to say we have gobs and gobs of unstructured data, data that's dark in all these enterprises, and this is the first technology that can actually unlock insights from that data," he added. "I'm very optimistic that this technology is going to really help companies become much more efficient over time, but it's going to happen at different rates."

### A GOOD BUBBLE?

Even if the current surge of investment in AI does prove to be a bubble that's pricked in the next couple of years, there are some that think it won't be a disaster. Among those, somewhat surprisingly, is the man behind one of those Magnificent Seven companies, Amazon founder Jeff Bezos.

In an interview at *Italian Tech Week* in early October, Bezos described the AI hype as an "industrial bubble as opposed to financial bubbles".

"The ones that are industrial are not nearly as bad, they can even be good," Bezos said. "Because when the dust settles and you see who are the winners – society benefits from those inventions. That's what is going to happen here too. This is real. The benefits to society from AI are going to be gigantic."

IDC's Crawford Del Prete thinks Bezos has a point. "This capacity that's being put in place is not going to go unused," he said. "It's going to be utilised by different customers that spin up these applications over time.

"Is there a risk that we're doing it ahead of how fast people can consume it? Of course, there's always that risk, but I do think this is a different type of situation. IDC spends a lot of time advising IT buyers. When a new technology comes out, whether it's the internet, whether it's the cloud, whether it's quantum computing, our stance will typically be, look, take a step back, evaluate it... This technology is the first technology we've said go to it, run towards it, embrace it.

"This is going to be something that you are going to need to master and leverage in your business model as quickly as possible," Del Prete added. "Because those that don't will do it at their own peril." ■

# Intel details 2026 product performance

## With laptops leading the way to 18A, Mark Williams sums up Intel's big reveals for next year's products.

**Intel recently unveiled Panther Lake during its 2025 Technology Tour, showcasing its next-generation laptop system-on-chip (SoC). This new chip is a simple evolution from Lunar Lake, aiming to enhance performance and efficiency for laptops. This technology will ultimately transfer to desktop CPUs and GPUs later down the track with Nova Lake-S and Arc Celestial.**

Panther Lake reintroduces E-cores for multithreaded performance (which were missing on the prior Lunar Lake SoCs) while retaining Lunar Lake's improved LP E-core power delivery. This offers battery life benefits with enhanced peak multithreading performance, providing the best of both worlds. It's Intel's first product on the 18A process node, bringing Intel to the semiconductor leading edge once again. Not all parts use 18A; the compute tile with CPU and NPU cores will, though the GPU tile will use TSMC's N3E or Intel 3.

Panther Lake SoCs will be made in three configurations: 8C, 16C, and 16C 12X. The 8-core variant comprises 4 P-cores, 4 LP E-cores, and 4 Xe3 cores. The 16-core version includes 4 P-cores, 8 E-cores, 4 LP E-cores, and 4 Xe3 cores, while the top-tier 12X version is the same as the 16C version, but boasts a larger 12 Xe3 core tile.

The Cougar Cove P-cores in Panther Lake exhibit enhancements over the previous Lion Cove, featuring a 50% larger L3 cache and improved branch predictors. Similarly, the Darkmont E-Cores and LP E-Cores have improved branch prediction capabilities, nanocode operations and power-saving modes. This allows these E-cores to shut down their front ends during idle times and dynamically pre-fetch data to better manage workload demands and power usage.

In single-threaded workloads, Intel asserts that Panther Lake offers 10% more performance at the same power levels compared to Lunar Lake, or consumes 40% less power when delivering the same performance. In heavier multithreaded scenarios, Panther Lake is claimed to offer up to 50% more performance or 30% lower power consumption, compared to Arrow Lake-H.

> "Panther Lake is claimed to offer up to 50% more performance or 30% lower power consumption, compared to Arrow Lake-H at the same performance level."

Thread Director now allocates tasks more efficiently, directing less demanding workloads to E-Cores or LP E-Cores. In GPU-limited tasks like gaming, it can shift CPU threads to E-Cores, boosting GPU performance by up to 10% by reallocating CPU power budget to the GPU.

Additionally, the new Xe3 GPU cores bring a 33% larger L1 cache and double the L2 caches compared to Xe2, reducing memory bandwidth contention. Improved ray tracing and fixed function units, and a 25% larger vector engine. Intel claims that Xe3 delivers an overall 50% performance increase over Xe2 and is up to 40% more power-efficient, ensuring that the additional Xe cores being crammed into Panther Lake don't substantially increase power consumption.

Expected to launch early next year, Panther Lake will help keep Intel in the game with the likes of AMD's popular Strix Halo. The Xe3 cores, at a 50% performance bump, will put desktop Arc Celestial in good standing next year. However, Cougar Cove, with just a 10% improvement over Arrow Lake, is a little worrying for Nova Lake-S, which is expected to reach desktop in the second half of next year. ■

*Mark Williams is an IT professional with a strong interest in voiding warranties.*

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FUTURE

# Amazon learns that you can't turn trillions of dollars into videogames

## Amazon Game Studios shows that opportunism alone won't make a dent in the prickly industry.

**Amazon is inescapable. Fifteen years ago, it was a decent option for importing goods that were either scarce or too expensive in Australia. During this century the company has branched virulently from its origins as an online book retailer, with fingers in content streaming, film and television production, consumer smart technologies, and cloud computing with Amazon Web Services.**

Until recently, it also had a large and growing presence in the games industry. Alas, in late October the company laid off 14,000 staff, many of whom worked under Amazon Games Studios. Its ultra-big budget MMO *New World*, which launched in 2021 amid much fanfare about its evolution of the genre, will shut up shop by mid 2026. Meanwhile a *Lord of the Rings* MMO is heavily tipped to be cancelled.

But Amazon isn't pulling out of games entirely: just days before the layoffs the company launched GameNight, a sub-section of its new Luna game streaming platform bundled with Amazon Prime subscriptions. The star of this effort is *Courtroom Chaos*, which is a cheap-looking couch party game starring an AI-powered Snoop Dogg. Needless to say, it would have cost a small fraction to develop compared to *New World*. It's also – putting aside Snoop Dogg's star power – an augur of the slop-oriented content Amazon thinks is a safe bet in the age of AI (pre-bubble burst).

Amazon failed at making big splashy games, despite Amazon being worth more than two trillion dollars. Cast your mind back to *Crucible*, the heavily-touted competitive shooter Amazon released and then unreleased within the space of a month. Like *New World*, it was a transparent attempt to make a game that would be endlessly, interminably monetisable, because no massive American company can countenance simply making a great game and releasing it.

It'd be amusing how bad these corps are at dabbling in gaming if it weren't for the many jobs at stake (see also: Google Stadia's failure). In February, former VP of Prime Gaming Ethan Evans even revealed that Amazon's intention was to disrupt Steam, which is funny because they were so bad at doing this that no one realised they were trying. "We were at least 250x bigger, and we tried everything. But ultimately, Goliath lost," Evans wrote on LinkedIn.

He was referring specifically to Prime Gaming by the way, which exists, albeit only in the imaginations of Prime subscribers who a) noticed it and b) scooped up the monthly free games it offered. That has now been replaced by Amazon Luna Cloud Gaming which is functionally the same, only now it offers game streaming via the cloud. Cloud gaming hasn't taken off but that's not to say it won't, and Amazon has AWS at its disposal.

I still don't think they'll lead that market though, because Amazon is a big, dumb company that doesn't know how to make games, doesn't understand the market for them (no matter how much data is at its disposal) and most importantly, probably doesn't think it needs to because of those trillions of dollars. Echoing Bobby Kotick on Microsoft: Amazon is not a creative company. Indeed, its destructive qualities are really the thing about it. ■

***Shaun Prescott is an Australian editor for PC Gamer and GamesRadar, and writes for APC, TechRadar and more.***

# Banishing buttons

## The next technology breakthrough will be sensational.

**Wandering around the show halls of IFA, (see p44), I was struck by how big some aspects of our industry expect smart glasses to be – and by how blind they are to exactly how bad their current offerings are.**

I don't care how much proponents claim otherwise, most offerings fall apart as soon as you look at the reality of their designs. This isn't a criticism of the designers: the problem is that the technology we need to make this format really work is several generations ahead of us. The components required to produce a truly useful, immersive AR experience do not yet exist. For consumer electronics firms, the sensible thing to be doing right now is working on the fundamentals of the OS and development platforms, so that we're ready when that breakthrough technology finally breaks through.

> "Repackage the phone, turn it into a communications hub that's compact enough for me to comfortably mount onto my belt, or keep in my man-bag."

There are other challenges too. The all-day aspect is problematic. Battery life has to exceed a waking day; six hours won't cut it. Having to continually swap back to your basic specs so that the smart ones can go on charge will grate badly.

But the most important question is how smart glasses are going to fit into the larger web of technology. Because we don't need yet another standalone gadget: we need a fabric of solutions, all working together in a variety of ways. I have that today with my Apple Watch, my phone and CarPlay. Adding in an always-in-view visual element could be enormously useful, as long as smart glasses can provide a significant value-add that makes them worth buying and wearing, versus just pulling my phone out of my pocket.

To continue that thought, at some point I can see smart glasses becoming good enough that I could entertain a future iPhone with no screen on it. Repackage the phone, turn it into a communications hub that's compact enough for me to comfortably mount onto my belt, or keep in my man-bag, preserving the crisp lines of my dinner jacket ensemble.

We're ready for an explosion of display-free, speech-oriented capabilities. Already I can control many capabilities of my phone by simply talking to it, and that's only going to grow. Where specific graphical capabilities are required, I can get that presented to me on my watch. If I'm driving, a suitably non-distracting user interface can be manifested via the CarPlay or Android Auto interface.

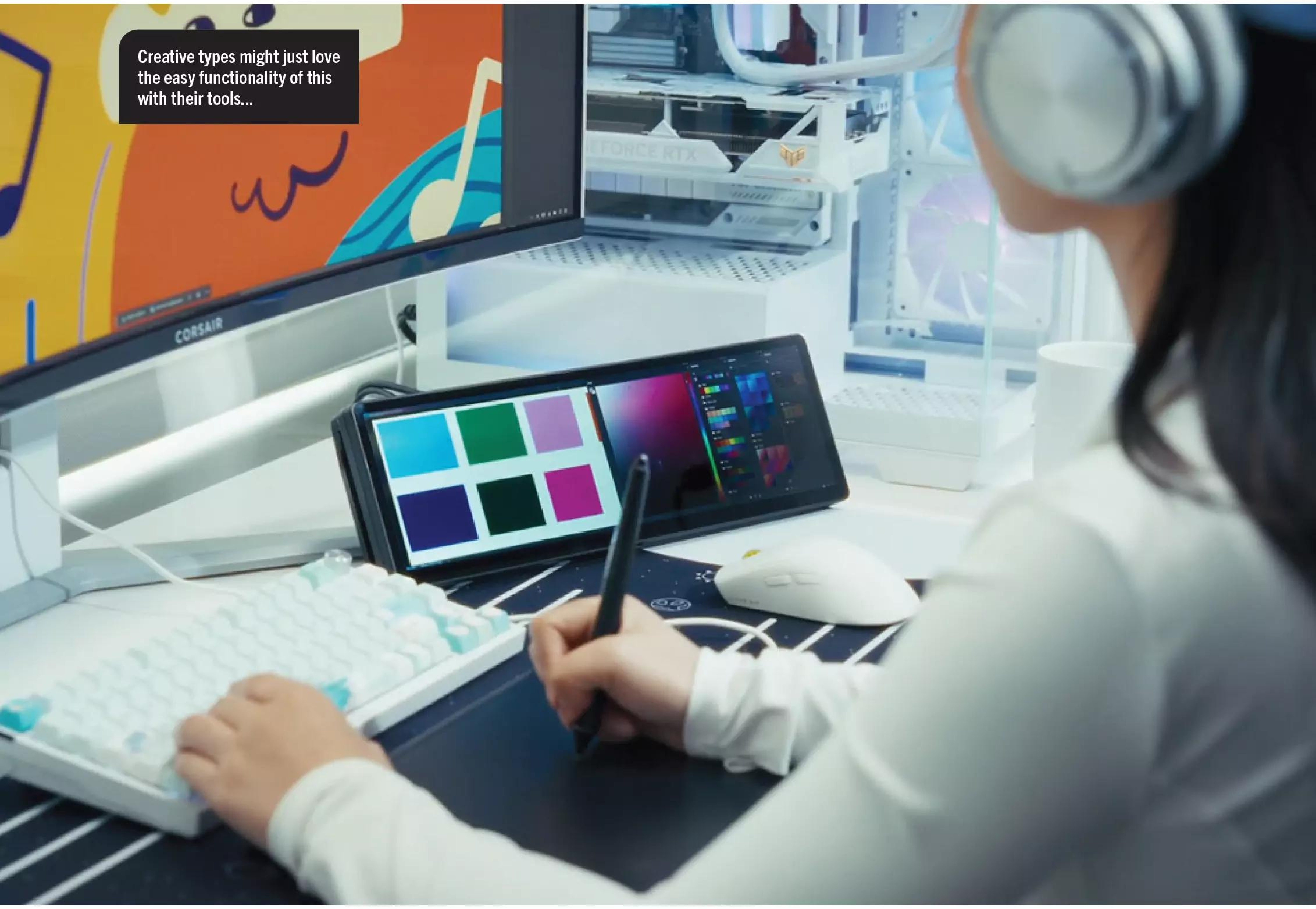
And this brings me to a further realisation. So far, almost every attempt I have seen at creating smart glasses has been focused on making the technology work. This is entirely the wrong way around: the task must be to get the technology to enhance and enrich my life, such that I forget it is there. Forcing me into cul-de-sacs of sandboxed capabilities, which require me to change the way I go about my day to satisfy the limitations of the platform, will result in failure every time.

Meanwhile, I'm looking forward to my next business trip, when "I'll have the boeuf bourguignon please – can you recommend an appropriately robust red?" will be automatically translated into German, Japanese or Korean. Only for the waiter to patiently suggest: "The Opus One 2021 would be an excellent match" – in perfect English, of course, because the rest of the world is better at speaking it than we are. ■

*Jon Honeyball looks forward to playing Doom while shopping at Bunnings.*

# GADGETS

Nice things to have



Creative types might just love the easy functionality of this with their tools...

## Corsair Xeneon Edge

**PRICE** $399 **WEB** corsair.com

Corsair suggests you do one of two things with this petite 14.5in 2560 x 720 display. Firstly, it thinks you might want to put it in your PC case, a niche we can certainly see it filling as long as you've got the case to support it without covering up its touchscreen with tempered glass. Second, slap on the included magnetic stand and place it beneath (or vertically beside) your monitor as a second screen, connected to a spare HDMI port. That one's the winner, if you ask us, because anyone who's gone ultrawide for their main screen either needs a gargantuan desk or a second screen that fits into a unique space. There's a secret third use, which is as a USB-C monitor for your laptop when you're out and about, though the hyper-wide form factor doesn't exactly lend itself to working.

It can be customised via the iCue app, too, with fun and work-related widgets.

...Or just show off your PC's performance and add some coolness to the look of your big rig.

The Arcam A25+ will bring your old-school hi-fi bang up to date.

# Arcam A25+

**PRICE** $3,295 **WEB** arcam.co.uk

British hi-fi maker Arcam knows a thing or two about great-sounding audio and this flagship streaming amplifier from its Radia+ range is a case in point. Equipped with Bluetooth and Auracast, the A25+ is powered by fifth-generation Class G amplifier design that's capable of outputting up to 100W of sound per channel to your home stereo speakers. It's also equipped with eArc for connection to a soundbar as well as USB-C, regular analogue and digital inputs/outputs, and a built-in phono stage – so anyone who loves their vinyl can have a wonderful listening time of it too.

**PRICE** $197 **WEB** logitech.com

## LOGITECH MX MASTER 4

A properly ergonomic mouse is a delight to use, and this new announcement pleases us. That's because Logitech has reworked its MX Master mouse for 2025, with this fourth-gen version boasting a slew of new features, including haptic feedback and an Actions Ring – a digital overlay that harnesses Logitech's Logi+ software to give you quick access to your most commonly used files and apps.

Aimed at right-handers, the MX Master 4 has a comfortable, ergonomic design just like the original, and is quieter and smoother to use than ever.

**PRICE** From $34 **WEB** amazon.com

## WHOOSH SCREEN AND PHONE CLEANER

Like us, you've probably used a bargain basement screen cleaning solution for your monitor, tablet and phone. But recently we were made aware of just how bacteria-laden these devices can become over time – especially phones and tablets. So when Canadian company Whoosh announced a big Australian launch for its hygenic cleaning products we gave them a try. We can't see bacteria, so will have to take their word on that effectiveness, but we can say these things made our screens sparkle more.

**PRICE** From $462

**WEB** blackmagicdesign.com

## BLACKMAGIC CAMERA PRODOCK

Designed for the new iPhone 17 Pro and Pro Max, the ProDock from Blackmagic brings all those 'pro' connections your next video project is crying out for. These include HDMI, microphone, headphone, and external drive connectors (USB-C), as well as BNC connectors for Genlock (which ensures multiple cameras stay in lockstep with each other with frame-by-frame accuracy), and Timecode. It also supports Apple's ProRes RAW format for video, which is making its debut on the 17 Pro.models.

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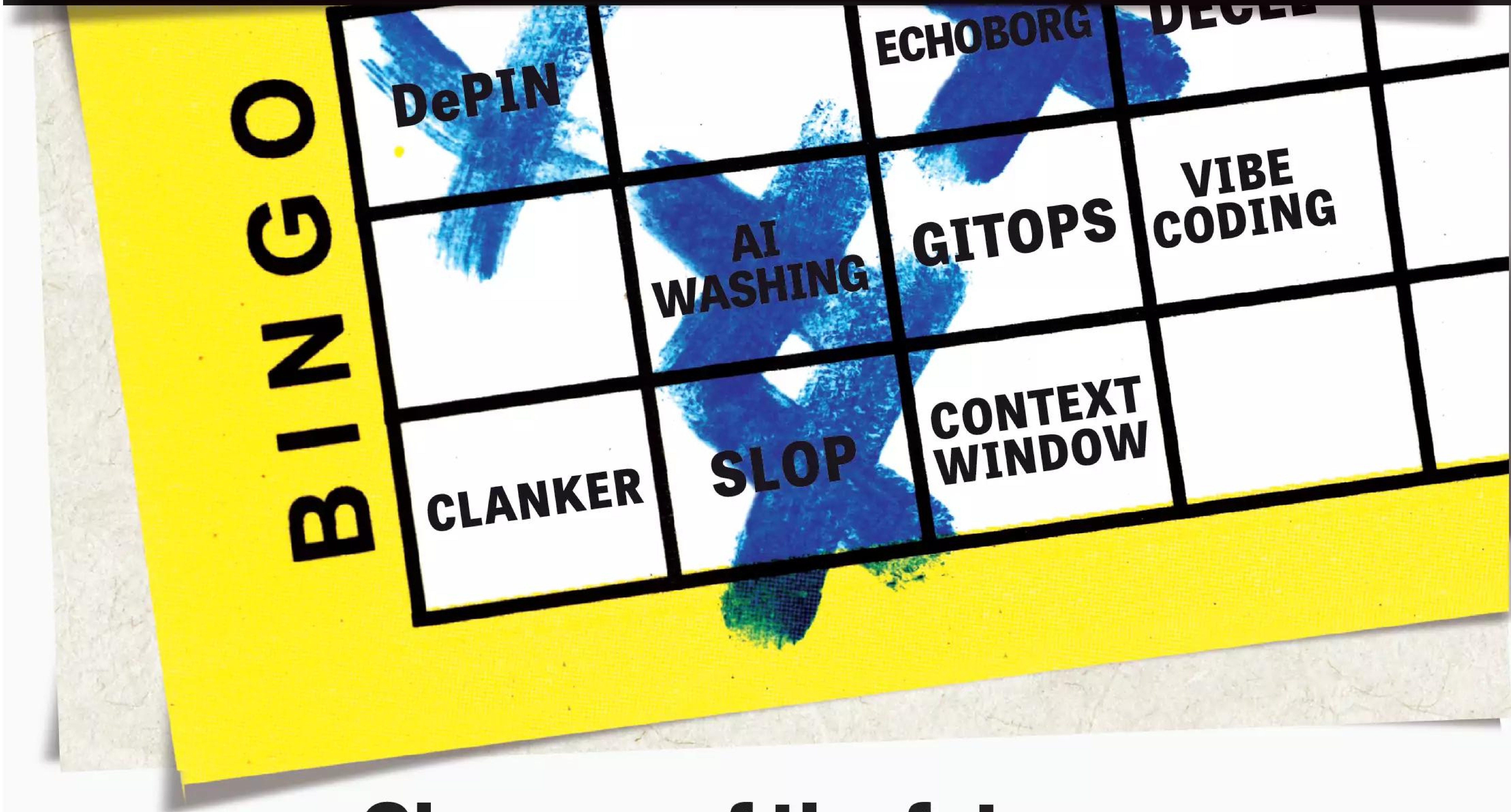
# FUTURES

We explore the trends and technologies that are set to shape the future



# Glossary of the future
## What does it all mean?

The advent of AI has sparked a thesaurus full of new tech jargon. Here's what it all means, according to Nicole Kobie.

**Language is always changing, and nowhere does that happen faster than with teenagers. But forget them and whatever the heck "skibidi" means: there's a flood of new words in the world of tech, too, thanks to the rise of AI and other future innovations hovering on the horizon.**

"Technology is bound to be an important driver of 'lexical innovation' – linguists' jargon for new vocabulary – when new concepts, processes and products are not encoded by our existing lexicon," said linguist Tony Thorne, the author of Dictionary of Contemporary Slang.

Clankers, glazing, vibe coding – these aren't just relevant to IT but to everyone, notes Thorne. "AI has generated a whole raft of new terms, and many of these are escaping the purely specialist environment and are becoming familiar to a general audience," he told *APC*. "'Hallucinations' in its new incarnation, for example, and now even 'vibe-coding', is understood by many in the wider world. 'Slop' never seemed like a particularly witty or clever usage, but of course it's super-relevant and has spawned derivations like 'ultraslop', 'retroslop', even 'slopfrastructure' and 'slopsquatting'."

Understanding such jargon matters, as some terms seem designed to obfuscate innovation for the general public. Consider the use of "hallucinations" in AI, which are merely to-be-expected inaccuracies in AI systems that have no sense of truth.

"It's actually a responsibility to ensure that a general public can make sense of rapid change, tech innovations and digital media, and to talk about these things honestly," Thorne said. "Politicians, developers and commercial interests can't be trusted to manage new technology responsibly, and even watchdogs and official oversight bodies – and mainstream media too – seem incapable of informing and protecting consumers."

Thorne says we need more vigilance when it comes to tech terminology. "The way we choose the language to describe or promote new technology is important not only because we should avoid mystification or excessive technicality if we can, so that non-specialists can decode the terms we invent, but also because this language sometimes becomes part of new and controversial activities."

Here's our glossary of the future to help you decode everything from "algospeak" to "vibe coding" – so when you hear these terms in meetings, you'll be able to figure out what the C-suite actually wants and reply with even more fancy lingo.

### AGENTIC AI OR AI AGENTS

These versions of AI can actually take action, rather than merely generate reams of text or quirky images. Thankfully, because AI remains stuck in our computers, that action is largely limited to navigating the web and filling out digital forms. If these agents work, AI might become useful for taking over our digital drudgery. At least until they take our jobs.

### AI WASHING

Marketing your product as having AI when it doesn't really, or only in a limited way. You know how every company claims to be AI native or AI first these days? That. **See also:** GPT-washing, jumping on the bandwagon, AI hype, every day since ChatGPT arrived.

### ALGOSPEAK

According to Adam Aleksic's new book on the topic – aptly named Algospeak – this refers to words created to evade algorithmic censorship on social networks, or any term otherwise shaped by algorithms. For example, Chinese-owned TikTok didn't like users chatting about death or other related topics; instead, they switched to the term "unalive" to dodge algorithmic controls. **See also:** leetspeak, euphemism treadmill.

### ARTIFICIAL GENERAL INTELLIGENCE

Commonly referred to by its acronym AGI, this is a term with an always shifting meaning. DeepMind co-founder Demis Hassabis says it means AI with "human-level cognition"; OpenAI CEO Sam Altman says AGI is "the equivalent of a median human that you could hire as a coworker", though in his company's contract with Microsoft it's defined as when AI can make $100 billion in profit. **See also:** shifting goalposts.

### BARE-MINIMUM MONDAYS

The opposite of starting as you mean to continue, this TikTok work trend is all about easing into the work week by spending the first few hours of your Monday organising yourself (read: doing laundry) and strategising (read: taking a nap) rather than feeling flustered (read: doing work). **See also:** Sunday scaries, lazy-girl jobs, quiet quitting.

### BRAIN ROT

This internet slang is applied to low-quality digital content, often found on social media, which is useless yet weirdly addictive, as well as the cognitive decline caused by such material. **Used in a sentence:** "I got tired of doomscrolling, so tried to relax with brain rotting instead – that was a skibidi move." **See also:** doomscrolling, bedrotting, lay down and rot (LDAR).

### BROLIGARCHY

A portmanteau of "bros" and "oligarchy", this trend relates to tech billionaires wielding their power over society and politics, and found its perfect example/nadir in Elon Musk's foray into the United States government with DOGE. **See also:** techno-feudalism – how the world has always worked, but this time around with terrible fashion sense.

### CLANKER

A derogatory term for AI or robots, derived from the Star Wars cinematic universe. Used in a sentence: "I called customer service, but there were no humans to talk to – just clankers." **See also:** wireback, cogsucker, tin can.

### CLOUD REPATRIATION

Remember back when servers were physical devices in the building, rather than something you accessed via AWS? Well, the good old days are back! Companies angry at cloud costs and their unpredictability are re-investing in their own on-premise systems again.

### CONTEXT WINDOW

How much an AI model can think about or remember, sort of like its memory. A wider or larger context window means more information can be considered, leading – hopefully – to improved accuracy. **Used in a sentence:** "If you want a larger context window, you'll have to sign up for a paid subscription."

### DECEL

Short for decelerationist, a derogatory term for those who think AI development should be artificially slowed down to help avoid, or help us humans prepare for, all the dangers that AI-developing companies keep warning us about, like an existential threat to humans.

### DELVE

A signifier for AI content, "delve" is one of a handful of words that generative AI systems use more than we humans, so its appearance suggests AI writing. Of course, some people do actually use that word, and now that AI uses it frequently, humans are probably going to start using it more, sparking a spiral of "delve" overuse that means we can no longer use it to spot machine-generated words. Another example is the punctuation device known as the "em dash" – beloved of professional writers, including this one, which is probably why AI uses it so much.

### DE-MONETISATION

When influencers are shadow-banned by the algorithms, reducing how much their content is shown to would-be viewers, hurting their chances to push unnecessary products to their followers. It's being digitally cancelled, but only on socials.

### DePIN

Short for decentralised physical infrastructure networks, this is blockchain in the real world, a way of applying that as-yet not very useful innovation to manage and control real-world assets such as sensors or edge computing. It's the internet of things meets crypto. Yes, we know.

> " Techno-feudalism: how the world has always worked, but with this time around terrible fashion sense"

### DIGITAL SOVEREIGNTY

The US is no longer trustworthy – if it ever was – so it's time to invest in our own cloud, AI or other technical services that are in our physical control; essentially, this means local data centres. Alternatively, a way to get Microsoft, AWS, Google et al to invest in local infrastructure. **See also:** cloud sovereignty.

### ECHOBORG

When a human's speech is entirely scripted or determined by an AI, this originally referred to a research technique for social psychologists but now also explains why the person that applied for that entry-level graduate role took ten seconds to reply after every question in the Zoom interview and said "delve" three times.

### FRUGAL TECH

Sustainable, affordable innovation that's designed to benefit people, frugal tech is seen as an antidote to the dominance of Big Tech, broligarchs and Silicon Valley. Used in a sentence: "I read a great feature about frugal tech in *The Guardian*, but still bought the new iPhone." **See also:** calm technology, dumb tech.

### GENERALISABILITY

An as-yet-unrealised goal for automation, in particular driverless cars, generalisability means a technology that can be used anywhere without much – or indeed any – localisation effort. For example, a self-driving car trained heavily in San Francisco could hit the streets in LA without years of work and billions of dollars in additional investment. Or a humanoid robot could see the dishwasher needed emptying and figure it out without smashing the crockery. **See also:** unicorns.

### GENERATIVE ENGINE OPTIMISATION

Like search engine optimisation (SEO), but GEO is targeting the attention of AI-powered search rather than humans. Bots talking to bots all the way down. **See also:** dead-internet theory.

### GITOPS DEVOPS, BUT ON GITHUB

Similar insider-indicating jargon built on the DevOps style includes ChatOps, LLMOps, ModelOps, MLOps, AIOps and really anything else with too much hype. All seem to be leading to NoOps, which removes humans from the loop using automation, though there's pushback via HumanOps. (That was initially written as a joke but appears to be a real thing.)

### GLAZING

When an AI sucks up to you by saying your writing or ideas are really awesome, in a bid to keep you using the machine. "That's a great question, Hal." **See also:** sycophancy, AI psychosis.

### GUARDRAILS

Rules built into an AI system in an attempt to prevent it from spitting out scary responses, such as violent, biased, overly sexual or racist images and text. After all, being nasty is a job for us humans.

### HALLUCINATION

A dramatic way to describe generative AI errors that suggests inaccuracies are mistakes rather than a key indicator of how these systems actually work, which is by making things up.

**Used in a sentence:** "We've made significant advances in reducing hallucinations, improving instruction following, and minimising sycophancy," said OpenAI announcing GPT-5.

### NATIVE

Not an acknowledgement of indigenous rights, but a way to jump on the technology bandwagon in order to sound ahead of the curve; useful for AI-washing. When the backlash against future tech begins, we'll surely be talking about "human-native" systems. **Used in a sentence:** "Our AI-native security app used to be called cloud-native, but marketing told us this would sell better."

### MEETING RECOVERY TIME

A measure of how long it takes to get back to actual work after a meeting. This is why you get so little done on days with too many Zoom calls or all-hands.

**See also:** Zoom fatigue, meeting-free mornings/days.

### P(DOOM)

The probability of doom or hope, or how likely you think AI will prove an existential risk and kill us all. See also: AI Doomerism, decelerationists.

### PROMPT ENGINEERING

Learning how to talk to the machines so they understand what you actually want, despite the fact these are language models designed to work with natural speech. Secondary definition: your most important new job skill.

**See also:** prompt tuning, tweaking until you get it right.

### RTO

An acronym for "return to office" that is usually accompanied by a "mandate", an RTO is a demand from management to get out of your pyjamas and commute to headquarters rather than work from home as we have all successfully done since lockdown. The opposite of hybrid working, RTOs are big in banking circles – the money needs to be babysat in person, it would seem – and increasingly so in technology.

**See also:** presenteeism, micromanagement, nostalgia for a long lost but not missed style of working .

### SCOPE 3 EMISSIONS

Emissions from a company are broken down into three types: Scope 1, or direct emissions; Scope 2, indirect emissions, such as the electricity used; and Scope 3, which are supply-chain emissions. The latter sound like they're someone else's fault, but when it comes to Big Tech this is where big rises in emissions are found: Google's Scope 3 includes the production of technical infrastructure such as hardware for AI and has increased by 22% year on year.

**See also:** greenwashing.

### SHADOW

A way to describe a technology or tool that's been snuck into a company under IT's nose without consideration of the potential risks. That includes shadow AI, and the original, shadow IT. **See also:** letting ChatGPT do your work for you.

### SHIFT LEFT

Not a political reference – sorry, Albo – but the trend of moving security considerations or other features earlier into the development lifecycle of software. **See also:** Secure by design.

### SLOP

The garbage content spat out by AI that's now clogging the internet, social media and our work lives. And, in turn, worsening AI itself. Often comes in the form of unfunny memes – weirdly often including babies for some reason – but can be applied to almost anything churned out by generation bots. **See also:** slopification, enshittification

### SYNTHETIC DATA

AI models need to be fed data for training, but there isn't always enough of the right type, so AI can be used to generate synthetic data to show that system in training. That makes sense with, say, driverless cars, as accidents or other extreme/rare incidents can be manufactured to show the AI model so it knows what to do if and when it happens in real life. But it could also mean AI-generated material is being used to train an AI to make AI-generated material, and it all gets a bit too meta for us. **See also:** model collapse, digital inbreeding

### SYNTHETIC WORKFORCE

When all employees are clankers.

**See also:** ghost knowledge worker, virtual human.

### TRENDBAIT

Aleksic defines this annoying trend as saying something in a social post in the hopes of sparking responses to go viral.

**See also:** ragebait, clickbait, the entirety of social media, tabloid headlines.

### VIBE CODING

Coined by Andrej Karpathy in early 2025, vibe coding is the use of AI to create an app or other software, writing the code itself based on user prompts alone. Tell an AI what you want, it writes the code, even if you don't know how – especially if you don't know how. ■

# REVIEWS

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*APC* is Australia's oldest consumer technology magazine – having been consistently in print for over forty years, since our first issue way back in May 1980 – and we take that heritage and responsibility very seriously. While our focus is obviously on the personal computer the very definition of the PC has changed and shifted markedly since the early 1980s.

As such, we touch on many other areas of everyday tech, too, from smartphones and apps to peripherals, accessories, and beyond. We have two goals: to find the best modern tech and to help you make the most of it.

## INDEPENDENT REVIEWS

Championing technology doesn't mean we're unrelenting yes-men and -women, however, and *APC* aims to be as objective as possible in all our coverage. That means identifying the best products from multiple perspectives – the best performance, best value and best features and, ideally, the products that offer the best mix of these three attributes.

As a matter of policy, reviews published in *APC* are not shared with product-makers prior to print. We will contact vendors under certain conditions; for example, if we have a problem testing a product that seems to indicate it may be faulty, or to invite a vendor to clarify how a particular feature works. If an *APC* reviewer has any potential conflicts of interest involving a brand, the review will always be assigned to another writer.

## LABS TESTING

*APC* strives to conduct the most rigorous, objective scientific tests and benchmarks we can so as to make our reviews as unbiased as possible. We use a variety of tools and programs for this, including many freely available benchmark suites for assessing media encoding, general system performance including storage read and write speeds, gaming and battery life.

## APC EDITOR'S CHOICE

When a product scores 4.5 out of 5, it carries the Editor's Choice Award. These are products that exceed expectations and deliver a quality experience up there with the very best.

## APC HIGHLY RECOMMENDED

You will see this award if a reviewed product has scored four out of five stars. It means most people can expect satisfying performance from the product, and that we would use it ourselves.

**PRICE** $429 **WEB** apple.com/au

# AirPods Pro 3

## Apple's best earbuds are now even better.

**Launched alongside the iPhone Air, iPhone 17 series and Apple Watch Series 11, the new AirPods Pro 3 could well be your next favourite earbuds. Apple's now made the world's best-selling headphones smarter than ever, while also giving them a subtle redesign that has not only made them smaller, but also ensures they fit more securely and comfortably in your ears.**

If you've never owned a pair of AirPods Pro – or you've only ever used the regular AirPods – the Pro 3 absolutely represent the very best of Apple's audio tech to date. They sound superb, their upgraded active noise cancellation is something Bose and Sony need to watch out for, and they're as comfortable as ever.

Chief among the new features is the addition of a new sensor on the inside edge of both earbuds, which measure your heart rate and track over 50 workouts. It's also tweaked the design of the earbuds so they fit better in your ears than AirPods Pro 2 and now includes five sizes of foam-infused silicone ear tips – L, M, S, XS and XXS. Other improvements include improved Active Noise Cancellation (ANC) and even better battery life, with the AirPods Pro themselves lasting for up to 10 hours between recharges with ANC on (that's two hours more than before) with up to 24 hours of use possible when used with the Charging Case. As before the Charging Case can be charged both wirelessly or by using its built-in USB-C port.

The AirPods Pro 3 also now support Live Translation when used with an iPhone with Apple Intelligence enabled and, of course, you can also still using them as hearing aids if you have moderate hearing loss – something you can find out yourself using the Hearing Test in Settings > AirPods Pro. Apple has also improved the AirPods Pro 3's water, sweat and dust resistance to IP57.

Just like the AirPods Pro 2, the AirPods Pro 3 set new standards for how good earbuds can be. They pair immediately with your iPhone and rarely suffer from wireless dropouts. Plus, they rarely 'drop out' for other reasons – the snug fit and silicone ear tips mean there's little danger of them coming loose, and they remain comfortable to wear for all-day listening.

Audio quality is great, with a larger bass vent ensuring everything, from music to movies to podcasts, sounds suitably realistic and, while their active noise cancelling can throw up some oddities (especially in Transparency mode where approaching vehicles take on a weird sushing quality), they leave lesser earbuds in the shade. All that, plus the ability to use them as hearing aids and a camera remote – plus the heart rate sensor – make them by far the best in class.

> "The AirPods Pro 3 also now support Live Translation when used with an iPhone with Apple Intelligence enabled and, of course, you can also still using them as hearing aids if you have moderate hearing loss."

The improvements simply don't justify the cost of trading up though – especially in Australia, where the Pro 3 retail for $429, an increase from the $399 launch price of their predecessor. That $30 increase might not seem like much given the improvements, but it's quite a hike compared to the US where Apple has kept the same US$249 price as the Pro 2 for this new model.

Had Apple kept the same $399 price tag, our opinion may have been toned down a tad. Yet, the fact the company is charging more for (what we deem) a very similar product just doesn't sit well. ■

**SPECS** H2 headphone chip Active Noise Cancellation (ANC), charging case with USB-C/wireless charging, up to 8 hours' battery life (AirPods)/24 hours (case); dust, sweat, and water resistant to IP57.

**VERDICT**

★★★★☆

Apple's AirPods Pro 3 continue to lead the way in fit, battery life and performance. A definite must-buy.

**ROB MEAD-GREEN AND MAX LANGRIDGE**

**PRICE** $779 **WEB** remarkable.com

apc
HIGHLY RECOMMENDED

# ReMarkable Paper Pro Move

## Nearly the perfect tablet for writing and drawing on the move thanks to its compact size and pen-on-paper feel.

**The reMarkable Paper Pro Move is an expensive tablet: it costs $779 with a standard Marker stylus, or $849 with a Marker Plus, which adds an eraser function to the opposing end. Is it worth the extra $70 just for a dedicated eraser? If you're asking that question, you're considering the wrong tablet. This is a luxury lifestyle device for the executive who has everything.**

To be more precise, the reMarkable Paper Pro Move is a thin and very lightweight writing tablet. Despite its lightness, it feels solid: I had no trouble holding it in my left palm and writing comfortably across the whole page with my right. Then I just tucked it into the back pocket of my jeans. I've always wanted a tablet like this.

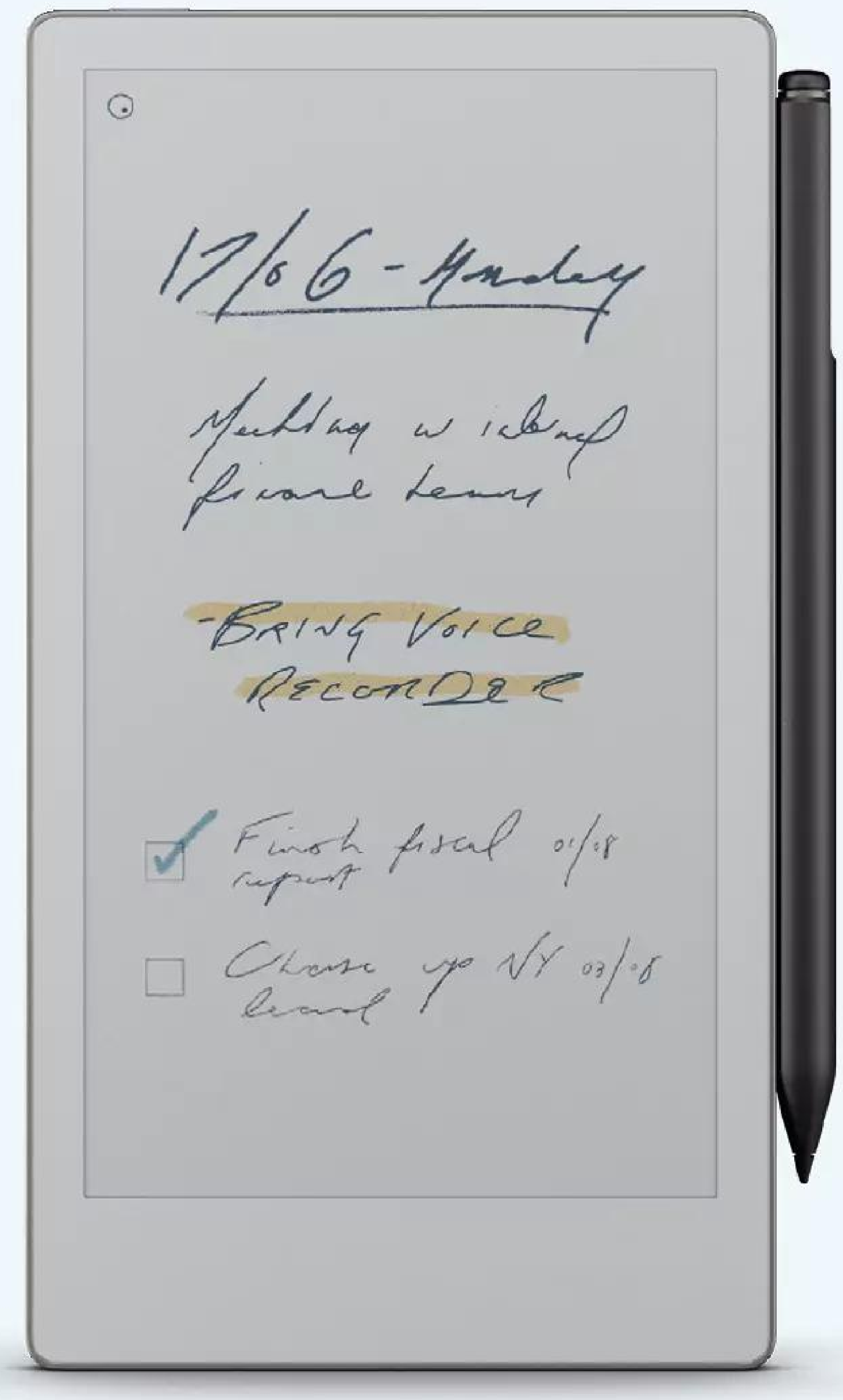
The design couldn't be simpler. The only button is for power; there are no speakers, so there's no need for a volume control. The pen attaches magnetically, and recharges its internal battery while connected, so I like to use a case to ensure it doesn't get knocked off. ReMarkable offers both leather, cloth and polymer folio options, at an extra cost of $229, $149 and $99 respectively if you order at the time of purchase. Sadly, there's no keyboard cover for the Move; I think it would be cool to see a mini keyboard for this tablet.

Other than its size, the most distinctive thing about the Paper Pro Move is its colour E Ink display (reMarkable calls it Canvas Color). This looks fantastic – much more like real paper than a regular LCD panel – and writing on it feels exactly like using my favourite Pilot Precise rollerball pen on a thick Moleskine notebook. When the results appear, themselves looking remarkably like real ink on real paper, the effect seems magical. The responsiveness helps: while you're taking notes, there's no perceptible delay between touching the Marker Plus to the screen and the E Ink appearing. If you write calligraphy or draw with the paint brush tools, you'll appreciate the responsiveness.

Note, though, that even the fastest E Ink displays react much more slowly than a conventional screen, and if you draw in colour you'll see the display shift a few times after you lift the pen as it renders the final image. Personally, I think this looks great – it reminds me of steampunk and alternative future display concepts. I realise that others will find it frustrating.

The reMarkable software lets you organise your notes into virtual notebooks and save them in folders. You can also insert tags throughout notebooks to make them easier to search. A new feature that uses AI to convert handwriting into typed, searchable text sounds useful, but I found the results ranged from useless to dangerously hilarious: many of my handwritten words were misread, and in one case came out X-rated.

Still, since the conversion happens in the cloud, I'm hopeful that reMarkable can quickly fix this by hooking up with a better service – for example, I've seen much better AI-based handwriting recognition on the Kindle Scribe.



Other than that, the operating system is extremely simple, almost pointedly so. There's no clock, for instance, so you won't be hassled by the time. There are no alerts or notifications. The Move won't ever buzz or vibrate for your attention. It also won't serve you ads in any way, or spam you with messages.

As for battery life, I've had the tablet for more than two weeks and I've charged it twice, including the initial charge time. That's pretty good for modern electronics; larger tablets such as the reMarkable Paper Pro can run for longer on a full battery, but I don't mind charging the Move every week or so. Actually, it's possible the Paper Pro Move has been dying faster because I'm using it more – after all, when you can stuff a tablet into your back pocket, it's always at hand.

I have a few criticisms. For one, the integrated lights aren't very powerful; you'll need an extra source of illumination to jot down a diary entry after lights out. More disappointingly, with this latest tablet, reMarkable has taken a step over to the dark side: unlocking the full range of note-taking templates, and connecting the device to mobile apps and cloud storage, requires a monthly subscription. This doesn't cost much ($4.99 a month), but it stings that an ultra-simple tablet with a premium price needs an additional subscription plan.

Despite those minus points, the reMarkable Paper Pro Move is the most effective and pleasant writing tablet I've ever used. The size is perfect, the features are focused, the writing experience is divine. Make no mistake, this is not a general-purpose device: it won't let you run your favourite apps, chat with an AI or browse the web – if you want more, you'll need to look elsewhere. But if you need less, the Paper Pro Move is the perfect solution. ■

**SPECS** 2-core 1.7GHz Cortex-A55 processor; 2GB RAM; 7.3in Canvas Color E Ink display, 1,696 x 954 resolution; 64GB storage; Marker stylus; Wi-Fi 5; USB-C 2; accessory port; 2,334mAh battery; reMarkable OS; supports PDFs, EPUB; 109 x 6.5 x 196mm (WDH); 230g; 1yr limited warranty.

### VERDICT

★★★★☆

Despite its compact size, it's powerful and fully featured.

**PHILIP BERNE**

**PRICE** $7,875 **WEB** www.lenovo.com/au

# Lenovo Legion Tower 7i (34L, Gen 10)

Want a top-tier gaming PC but don't want to build your own? Lenovo has a tempting option.

LEGION
apc
EDITOR'S CHOICE
Lenovo

**Whether you need a new desktop PC to deal with the end of Windows 10 or you just want to upgrade, your first question is often: should you build one yourself or buy a pre-made model? The first option can be greatly rewarding and leaves you with your ideally spec'd computer that's likely got future upgrade potential. However, it can be daunting, it takes a great deal of time, the DIY cost savings don't always manifest and there's always that dread that you'll break something. Making everything look nice, neat and tidy is another thing altogether.**

There are many systems integrators that offer various qualities of pre-built, highly-configurable PCs but trust and warranty is often a concern. Big brand alternatives are often less exciting, less flexible and offer less future-proofing but you do get more peace of mind thanks to, in this instance, Lenovo's three-year on-site warranty.

So, it was a particularly pleasant surprise to see Lenovo's latest (Gen 10) 34-litre, Legion Tower 7i gaming PC. Because, well, just look at it. The 'Storm Grey' case, with its ARGB lighting glowing outwards, looks awesome and feels very high quality.

Our review unit featured an Intel Core Ultra 9 258K processor, a 2TB NVMe drive (an extra one costs $800) and four 32GB DDR5-5600 UDIMM Samsung RAM sticks (Note: Lenovo's online configurator limits you to 64GB but there is an option to upgrade to more-overclockable DDR-5-6400 CDIMMs for $160). There's also a massive Nvidia GeForce RTX 5080 graphics card (with matching lighting) plus a bog-standard, bespoke Z890 motherboard. Using two thumb screws to open the back provides access to an 850-Watt Liteon PSU (1,200-Watts costs $160 more) plus two 3.5-inch hard drive slots. There's theoretically space for four more SSDs though they're hard to access (all are PCIe 5.0 compatible but Lenovo only supplies PCIe 4.0 options). The extra two x16 and x1 motherboard slots are inaccessible. Inside there's Wi-Fi 6E and Bluetooth 5.3 but Wi-Fi 7 only costs $10 more.

The benchmark scores illustrate that this is a serious gaming powerhouse and we had no problem playing any games at the highest detail settings.

What's almost more impressive is that the PC essentially runs silently whatever you throw at it – despite there being two top fans, one rear and three cooling the large CPU radiator behind the front panel. Cable management won't win any contests but it's still very neat. Ultimately, the Tower has some impressive thermal management.

Top-mounted I/O ports consist of one USB-C and three USB-A ports (all of which are a mixture of 3.2 Gen 1 and Gen 2) plus a 3.5mm audio jack. At the rear, there are seven more USB-A ports plus a Thunderbolt 4 port, 2.5Gbps Ethernet LAN, five 3.5mm audio jacks and optical out.

Ultimately, if you want to splash-out on an off-the-shelf, awe-inspiring, silent-but-deadly gaming desktop, this is it. The downside is the huge sticker price of $7,875! However, we've already seen it at almost one-third off in Lenovo's (regular) sales and so we're happy to recommend it. ■

| BENCHMARK RESULTS | Lenovo Legion Tower 7i (Gen 10) | Asus ROG NUC 15JNK |
|---|---|---|
| **CPU** | **Intel Ultra 9 285K** | **Intel Ultra 9 275HX** |
| **GPU** | **RTX 5080** | **RTX 5080** |
| **RAM** | **128GB** | **32GB** |
| Street Price | **$5,888** | **$5,888** |
| PCMark 10 - Overall (score) | **9,400** | 8,842 |
| Geekbench 6 - Multi-core | **20,090** | 18,721 |
| Geekbench 6 - Single-core | **3,127** | 3,048 |
| Geekbench 6 - GPU | **248,600** | 212,120 |
| Cinebench R24 - CPU Single Core | **135** | 134 |
| Cinebench R24 - CPU Multi Core | **2,152** | 1,946 |
| 3DMark SpeedWay | **8,846** | 5,761 |
| 3DMark Port Royal | **20,796** | 12,209 |
| Steel Nomad | **8,436** | 5,249 |
| Cyberpunk 2077 - 1600p RT Low (DLSS) | **162** | 122 |
| Cyberpunk 2077 - 1600p RT Low (No DLSS) | **121** | 82 |
| Cyberpunk 2077 - 1600p RT Ultra (DLSS) | **102** | 80 |
| Cyberpunk 2077 - 1600p RT Ultra (No DLSS) | **59** | 40 |
| Black Myth Wukong - 1600p Cinematic | **139** | 105 |
| Shadow of the Tomb Raider 1600P DLSS Off | **178** | 176 |
| CrystalDiskMark Read (MB/s) | **7,127** | 6,852 |
| CrystalDiskMark Write (MB/s) | **6,584** | 6,410 |

**SPECS** Intel Core Ultra 9 Processor 285K; Nvidia GeForce RTX 5080 GPU; 64GB DDR5-5600 RAM; 2TB NVMe PCIe Gen 4 SSD; 5x USB-A 3.2 Gen 1 ports, 5x USB-A 3.2 Gen 2 ports, 1x USB-C 3.2 Gen 2, 1x Thunderbolt 4, 6x 3.5mm audio jacks, 1x optical out; 2.5Gbps LAN, Wi-Fi 6, Bluetooth 5.3. 211 x 452 x 477mm, 18KG.

## VERDICT

★★★★★

Gorgeous, silent and deadly. But it's way too expensive if you don't buy it in a sale.

**NICK ROSS**

**PRICE** $3,699 **WEB** gigabyte.com

# Gigabyte Gaming A16 Pro

Get your game on with this capable but affordable machine.

apc HIGHLY RECOMMENDED

**Powered by an RTX 5080 and featuring a large 16in, 165Hz display, the A16 Pro delivers excellent gaming performance while doubling as a capable workstation. At the time of writing, there are two A16 Pro variants for sale – both equipped with the Intel Core 7 240H CPU, 32GB of (soldered) 5600MHz LPDDR5x RAM, a 1TB SSD and either an RTX 5070 Ti or, as tested, the RTX 5080.**

The large screen folds back through 180 degrees to lay flat, has a 2560 x 1600 resolution, a 3ms response time, a decent 400 nits brightness and displays an excellent 100% of the sRGB colour gamut. Ports include HDMI 2.1, a 5Gbps USB-C port with power delivery and DisplayPort 1.4, 2x USB-A 5Gbps (plus a USB-A 2.0 port), Gigabit Ethernet and a 3.5mm headset jack.

For the Gaming A16 Pro, Gigabyte includes a MUX switch but caps the GPU TGP for the 5080 at 115W. The 5080 can run at up to 150W, so the 115W limit in the A16 Pro means performance sits about halfway between that of an unfettered 5080 and a 5070, and is similar to a 5070 Ti. While this seems like a major downside, what matters is performance for your dollar, and the Gaming A16 Pro is cheaper than a lot of higher TGP 5080 machines. At 36 x 26 x 2.3cm, and weighing 2.3kg, it's also slimmer and lighter, making it a better choice for those who want to carry it around every day.

For demanding games at the screen's native resolution, you will need to scale back the quality settings to maintain over 60 fps, while older ones will happily run at over 100 fps. To push towards the 165Hz the screen is capable of, you will need to drop back to 1080p. It depends on your game (or app) of choice, but the 115W TGP 5080 is about 25% slower than one at 150W, and up to 22% faster than a 5070. At full tilt, the Gaming A16 Pro emits a fairly loud roar from the cooling fans, but despite this, for sustained loads, performance is limited by the cooling capacity.

The A16 Pro is also a very capable workstation and we measured up to 90W charging via USB-C, so it can provide decent productivity performance without having to lug the larger power brick around. We wish it had a larger battery than the 76Wh models used, as while the 10 hours, 37 minutes of video playback is a good result, we were disappointed by under five hours of light-duty work.

The keyboard and trackpad are both excellent, and the customisable RGB lighting modes are fun but also easily toned down to white if you want to blend in at the office. The 1080p webcam is nothing special in terms of image quality, but it does facial recognition for fast log-ins.

While the A16 Pro is an excellent machine, the purchase decision comes back to price. If you can buy it for 30% less than a comparable full TGP 5080 machine (or on par with unrestricted 5070 Ti laptop) then it's a solid buy, but otherwise wait for a sale. ■

| BENCHMARK RESULTS | Gigabyte Gaming A16 Pro | Alienware Aurora 16X |
|---|---|---|
| **CPU** | **Intel Core 7 240H** | **Intel Ultra 9 275HX** |
| **GPU** | **RTX 5080 (115W TGP)** | **RTX 5070 (115W TGP)** |
| **RAM** | **32GB** | **32GB** |
| Battery | **76 Wh** | **96 Wh** |
| Street Price | **$3,699** | **$4,197** |
| PCMark 10 - Overall (score) | 7,523 | **8,437** |
| Geekbench 6 - Multi-core | 13,503 | **19,615** |
| Geekbench 6 - Single-core | 2,744 | **3,068** |
| Geekbench 6 - GPU | **177,521** | 136,686 |
| PCMark 10 - Battery Work (HH:MM) | 3:19 | **6:01** |
| Cinebench R24 - CPU Single Core | 117 | **133** |
| Cinebench R24 - CPU Multi Core | 832 | **1,964** |
| 3DMark SpeedWay | **4,247** | 3,664 |
| 3DMark Port Royal | **10,744** | 9,031 |
| Steel Nomad | **3,967** | 2,846 |
| Cyberpunk 2077 - 1600p RT Low (DLSS) | **84** | 76 |
| Cyberpunk 2077 - 1600p RT Low (DLSS off) | **52** | 50 |
| Cyberpunk 2077 - 1600p RT Ultra (DLSS) | **55** | 54 |
| Cyberpunk 2077 - 1600p RT Ultra (DLSS off) | **25** | 16 |
| Black Myth Wukong - 1600p Cinematic (DLSS) | **77** | 76 |
| Shadow of the Tomb Raider - 1600p (DLSS off) | **137** | 131 |
| CrystalDiskMark Read (MB/s) | **6,982** | 6,939 |
| CrystalDiskMark Write (MB/s) | 6,481 | **6,740** |

**SPECS** W11 Home; 16in, 2560 x 1600 pixel resolution, 400 nits, 100% sRGB; Intel Core 7 240H CPU; Nvidia RTX 5080 (115W); 32GB LPDDR5x 5600MHz RAM; 1TB SSD; 76Wh battery (3h 19min PCMark 10 Work battery); 36 x 26 x 1.95 – 2.3cm; 2.3kg.

## VERDICT

★★★★☆

Solid performance despite the lower power and cooler limits and a well-equipped machine overall.

**LINDSAY HANDMER**

apc
HIGHLY RECOMMENDED

**PRICE** $329 **WEB** logitech.com

# Logitech G515 Rapid TKL

It's rare that a keyboard hits sixes for both gaming and typing, this one does.

**Ostensibly an evolution of last year's G515 Lightspeed TKL, the new Rapid model really warrants being considered as an all-new product. While it shares the same chassis shape and key layout, the addition of magnetic analogue switches elevates it into a class of its own.**

These keys are intended to provide a gaming advantage – and they definitely do – but for plain old typing I'm having trouble recalling any keyboard I've enjoyed so much. The secret sauce is the magnetic analogue mechanism, and every single key on this board has it. These are gaining in popularity, though add to the cost, and at $329 the G515 Rapid TKL is pricey. Thus, compromises have been made by Logitech to keep the cost down: it's not wireless, it has no media volume roller – or indeed any dedicated media keys, there's no included wrist rest, and you can't adjust the RGB via the keyboard – annoyingly you'll need that app for that.

Initially these losses put me in a negative mindset as I first started testing it. The lack of a media roller was particularly painful, and still is. But these keys, oh gosh these wonderful delightful keys. Magnetic analogue senses how far you are pushing, just like gradually moving a joystick. In games you can configure this for true analogue inputs like running speed, lean angle, and much more. Or, you can set the actuation to trigger at a specific point, and do this individually per-key. So, you might have your WASD keys with analogue range for character speed, and set other keys with short actuation for quick actions, like throwing a grenade. It's literally a game changer, and Logitech's keys in particular are up there with the best. They have 2.5mm of travel, and you can customise the actuation from .1mm to 2.5mm.

For typing they are quiet (a dull, near-silent Mercedes car door sound), perfectly sensitive and have just the right amount of travel. Out of the box, the default settings were lovely, but for finicky typists it's worth doing some experimentation with actuation distance to get the feel exactly right.

"You might have your WASD keys with analogue range for character speed, and set other keys with short actuation for quick actions, like throwing a grenade. It's literally a game changer."

As impressive as it is, it's not quite perfect. For me the elevation angle is a bit too shallow. A bit more height from the kick stands would have been nicer for slouch typers or gamers to see the full board properly. The lack of a wrist rest isn't a personal issue, but could be a deal breaker for some. I also loath having to install an app to control RGB, but on the flipside you wouldn't buy a magnetic analogue board without intending to do some customising via the app, so that's a bit of a moot whinge.

A couple of issues were encountered. My test unit wouldn't turn its RGB off when connected to a Mac and in sleep mode, though worked just fine on a PC. The F1 key was also a few seconds behind the others for coming to life, or showing a colour change. Logitech sent me a replacement board after I raised this, and the second time around it was the F5 key that had illumination issues, while the RGB still stayed on during sleep on a Mac. A bit more QC needed, I think Logi.

Overall, though, despite some shortcomings it's a gem that's delightful to use for work or fun. ■

**SPECS** Low-profile key switch: actuation force: 35 +/- 7g; total travel distance 2.5mm; customizable Actuation from .1mm to 2.5mm; features: Rapid Trigger, Key Priority, Multipoint Action; dimensions: Height: 22 mm, Width: 146 mm, Depth: 354.75 mm; Weight: 800 g.

**VERDICT**

★★★★☆

You'll fall in love with the magnetic analogue switches, but will miss some QoL features that really should have been standard.

**BEN MANSILL**

**PRICE** $179.95 **WEB** www.logitech.com

# Logitech Signature Slim Solar+ K980

## An interesting gimmick tied to a rather cheap feeling keyboard.

**The Logitech Signature Slim Solar+ K980 is a solar-powered keyboard with the hook being that you might never need to charge it while using it wirelessly. It's also rather slim, designed with a clutter-free desk look in mind.**

You can't charge the Logitech Signature Slim Solar+ via any other means but light, as it doesn't feature removable batteries or any kind of direct charging port. A wide ridge cut at the top of the keyboard incorporates its solar panel, which can take in power either from direct sunlight or from ambient lighting within a room, though that's likely to be less rapid at recharging it, as you might expect. Logitech's claim here is that the Signature Slim Solar+ K980 should be able to run for up to four months in complete darkness.

Sadly the *APC* testing budget doesn't extend to hiring out pitch black caves for long enough to fully test that claim out, though during my review period it didn't dip much below its 100% mark even though Logitech's Options+ app informed me that my ambient room lighting, located directly above the keyboard might not be sufficient to keep it charged.

Arguably the bigger challenge here will come when the embedded batteries start to lose capacity (or if they fail) because there's no backup charging or connectivity option.

In layout terms, the Signature Slim Solar+ K980 is a full width keyboard with number pad and keys for pairing to up to three devices via Bluetooth, with quick switching keys that do work well flipping between devices in testing.

Logitech also includes a single 'Smart Action' key that can be programmed for macro-style app launching or other specific functions through the Options+ app. That app also allows for reprogramming any of the function keys, Copilot key and specific function keys sitting just above the number pad as desired. Those additional number pad function keys by default cover calculator launching and camera and mic enabling/disabling, but can be set for other functions. It's compatible for both Windows and Mac, with labels for both platforms printed on keys where needed, but also supports Linux, ChromeOS, iPad/iOS and Android, though there's no Options+ app for those platforms.

While the solar part of the Signature Slim Solar+ K980 is interesting, the rest of the keyboard is a little more basic, with simple scissor switches underneath each key that do give it a slightly softer sound than most keyboards, but also a very flat presentation.

There's decent separation space between each key, but the effect of those scissor switches is to make the Signature Slim Solar+ K980 feel rather like a cheaper keyboard than its $179.95 asking price might suggest. Logitech does claim they're good for up to 10 million keystrokes. I do type fast, but not quite that fast, but the lighter and cheaper feel may well have me reaching for a nicer feeling keyboard before I hit that keystroke limit anyway.

Comfort isn't helped by its very light tilt angle, with no adjustable feet at the back which would have aided in customisability; I've no idea why Logitech didn't opt for such a simple tweak to its design. ■

**SPECS** Dimensions: 142.9x16.96x430.8mm, Weight: 700g, Bluetooth Connectivity: Up to 3 devices (Windows/Mac/Linux/ChromeOS/iOS 15 or later, iPadOS 15 or later, Android 12 or later), Range: Up to 10m, Battery life: Up to 4 months in darkness (claimed).

### VERDICT

★★★☆☆

Long battery life is a big plus, but it's otherwise a bit basic.

**ALEX KIDMAN**

apc
EDITOR'S CHOICE

**PRICE** $239 **WEB** asus.com

# Asus ROG Harpe II Ace Gaming Mouse

## More in less.

**The ROG Harpe II Ace is what happens when Asus takes an esports mouse and gives it real-world refinement. Weighing just 48 grams (sans dongle), this semi-symmetrical ultralight's low-slung shell practically disappears in your hand. We're coming at the Harpe II Ace from the already lightweight Glorious Model O and the weight difference in the hand is not insignificant.**

The warm-touch "bio-based nylon" finish feels premium and grippy, and a welcome change from the slippery plastics typical of ultralights. Build quality and overall design is tight and feels more robust than its feather weight would suggest.

Performance is stellar. The 42,000-DPI ROG AimPoint Pro sensor tracks flawlessly – even on glass(!) – while ROG Optical Micro Switches offer crisp clicking with a 100-million-click lifespan. SpeedNova 8K wireless technology boasts polling rates up to 8KHz over standard 2.4 GHz, offering near-wired responsiveness via a standard micro dongle. Tri-mode connectivity (2.4 GHz RF, Bluetooth, and wired USB-C) makes swapping between devices a snap, and battery life is genuinely impressive. We managed several days gaming and casual use before needing a top-up.

Deeper customisation options and settings tweaks for DPI, lift-off distance, and debounce timing are made simple via Asus Gear Link browser-based interface. You can also get tweaky with Armory Armoury Crate if you already have it or just like installing things.

At $239 AUD, the Harpe II Ace squeaks in below other flagship offerings like Razer's DeathAdder V3 Pro while delivering precision and featherweight featherweight comfort. We love it. ■

### VERDICT

★★★★⯪

An esports-grade mouse that also feels fantastic for everyday life.

**TROY COLEMAN**

**SPECS** Sensor: 42,000DPI; 8,000Hz maximum polling; Connectivity: USB2.0, Bluetooth 5.1, RF 2.4GHz; Weight: 48g

apc
HIGHLY RECOMMENDED

**PRICE** $169 **WEB** www.corsair.com

# Corsair Sabre V2 Pro Ultralight

## Light as a feather, swift as a bird.

**In shooters like *Valorant* or *CS: Go*, or MOBA games like *League of Legends* or *Dota 2*, a mouse functions as an extension of the arm, making a lighter model often preferred by top-level players. If lightness is what you're after, the Corsair Sabre V2 Pro offers just that. Weighing roughly the same as your average lunchbox muesli bar, the Sabre V2 Pro is Corsair's lightest-ever mouse (just 36 grams), making it feel almost imperceptible during use.**

There's no question the Sabre V2 Pro provides the speed and precision that elite gamers need for a fast, fluid experience, free from fatigue and drag. And, given how insubstantial the mouse feels in-hand, it's impressive that it can still offer up to 70 hours of battery life.

Beyond its astonishing lightness, it also delivers an insanely high 33,000 DPI and a maximum polling rate of 8,000Hz, making sure your movements are incredibly responsive and lightning fast.

Its wireless connection relies solely on a compact, rectangular 2.4GHz receiver, which also sports a USB-C port for wired play. While Bluetooth connectivity would have been a welcome addition, the input lag it would cause would likely negate its benefits for most competitive gamers.

Still, unless you're specifically after that super lightweight feel, the Sabre V2 Pro will probably be too light for most users. Optional grip tape and replacement mouse skates are thrown in to bulk it up a bit, but you may find the mouse feels kinda hollow when you're not gaming. ■

### VERDICT

★★★★☆

Those looking for a mouse that feels like you're holding nothing at all.

**STEPHEN LAMBRECHTS**

**SPECS** Sensor: 33,000DPI, 8,000Hz maximum polling; Connectivity: 2.4GHz wireless USB-A adapter with USB-C port for wired play and charging; Weight: 36g.

apc
HIGHLY RECOMMENDED

**PRICE** $997 **WEB** tinyurl.com/APC552ally

# ROG Xbox Ally

## The more affordable Xbox Ally is a modest handheld that does its job.

**A couple of years ago, Asus ROG released the Ally, the first Windows handheld gaming PC from a mainstream OEM, and despite strong competition from the established Steam Deck, this device managed to make a place for itself among PC gamers.**

Now Asus has found a new way to make its next-gen device appealing by partnering with Microsoft to create the Xbox Ally, a Windows handheld that improves upon the Ally classic.

Unlike the more powerful Xbox Ally X, this more affordable white handheld utilises a relatively modest AMD Z2 Series processor that offers performance more on the level of the Steam Deck.

The Xbox Ally has similar internals to the 512GB Steam Deck OLED, which costs $549.00. However, these two devices offer several feature trade-offs, including running SteamOS versus running Windows 11.

The first thing you likely notice when looking at it is its relatively enormous grips, which were inspired by the official Xbox Controller. They are far more ergonomic than any other handheld out there right now. This handheld was also designed with upgradeability in mind, so the SSD is immediately accessible for easy swapping.

As with the original ROG Ally, the Xbox Ally features a 7-inch IPS touchscreen that produced 97% of sRGB in a colour gamut test, which is solid for this kind of screen.

It might not make colours pop against true black like an OLED does, but details come through crisply on the 1080p panel. Meanwhile, this display also supports VRR (variable refresh rate), AMD Freesync Premium, and 120Hz refresh rate to improve motion clarity in gaming.

The Xbox Ally utilises an AMD Ryzen Z2 A processor, which has four cores, eight threads, and uses the same RDNA2 architecture that the Steam Deck's custom AMD processor does. Basically, on paper the Xbox Ally has the same performance level as the entry-level Steam Deck OLED, which also has 16GB RAM and 512GB SSD like the Xbox Ally does.

The Xbox Ally really shines when it comes to playing simple graphics games like *Among Us*, *Stardew Valley*, *Celeste*, and *Hollow Knight Silksong*. Otherwise, it's an ideal cloud gaming device that also runs Windows.

Nvidia GeForce Now and Xbox Cloud Gaming pair extremely well with this handheld. As an example, when I ran *Cyberpunk 2077* locally on the Xbox Ally using the Steam Deck graphics preset, it was only able to hit an average of 31 FPS while experiencing significant lag, screen tearing, and choppiness. But when I streamed *Cyberpunk 2077* via GeForce Now from a far more powerful server, I was able to get a buttery smooth 86 FPS.

If you specifically want a handheld to play simple life sims or 2D platformers on, then this performance will be just fine. Otherwise, you might want to consider a more premium handheld like the Xbox Ally X.

There are far more flashy handhelds on the market right now, but the Xbox Ally presents a more affordable option for people to choose from. Ideal for Xbox Cloud Gaming, GeForce Now, and other cloud services, this handheld can take advantage of the performance offered by distant servers to stream games. It's also a great option for locally run games that aren't all that demanding, or titles that have been optimised to run well on Steam Deck. ■

**SPECS** Display: 7-inch FHD (1920 x 1080) 16:9 IPS touchscreen, 120Hz, 500 nits, VRR; CPU: AMD Ryzen Z2 A, 4 cores, 8 threads (6-20W TDP); GPU: AMD Radeon RDNA 2 Graphics, 8 cores; Memory: 16GB LPDDR5X-6400; Storage: 512GB M.2 2280 SSD; Connectivity: Wi-Fi 6E + Bluetooth 5.4; Ports: 2x USB-C 3.2 Gen 2, 1x UHS-II microSD card reader, 1x 3.5mm headphone jack; Battery: 60Whr; Size: 290.8 x 121.5 x 50.7mm; Weight: 670g.

### VERDICT

★★★★☆

Its comfortable grips, convenient button layout and lower price make it a decent choice for anyone wanting an entry-level Windows 11 handheld.

**REBECCA SPEAR**

**PRICE** $599 **WEB** asus.com

# Asus ROG Ryuo IV SLC 360

## A showpiece liquid cooler for builders who want serious thermal performance combined with flair.

**The ROG Ryuo IV SLC 360 ARGB is built to do more than just cool a CPU, and is aimed at those who want every part of their build to stand out and don't mind paying for it. This 360 mm AIO cooler goes beyond just a normal screen, with a 6.67-inch curved panel that turns your CPU block into a miniature billboard with a surprisingly good 3D depth effect.**

The cooler is not just flashy and the hardware is solid – Asus uses an aluminium radiator paired with ROG MF-12C ARGB fans to deliver high airflow and high static pressure without it getting too noisy. The pump and integrated CPU block have paste pre-applied, so it's ready to use straight out of the box. The wiring is especially neat as the fans daisy-chain power and lighting into a single easy to route cable.

The block's mounting system is uncomplicated and installation is straightforward. In the box you get brackets for both Intel LGA 1851 and 1700 plus AMD AM5 and AM4. Depending on your build, make sure to check tubing lengths, as the 200 mm pipes are a bit shorter than on many 360 mm AIOs. This helps the unit look cleaner and keeps the display unobstructed, but it can limit placement. For example, it's likely not going to suit a top mount with long hose routing, so make sure you double check before buying.

Installed on our test bench (with an Intel Core i9 14900K), the Ryuo IV SLC did a bang up job. Despite high loads, it kept gaming temps near 45°C and in a stress test peaked at only 72°C (74°C when overclocked). The results mean it competes well with other premium 360 mm AIO coolers, so you are not trading away cooling capacity for aesthetics. There's a bit of fan noise under full load, but in a closed case during typical gaming it's not going to be annoying.

With performance out of the way, let's talk about the screen. It's a 6.67-inch 2K curved AMOLED panel, though the exact resolution isn't given. Asus has really leaned into the naked-eye 3D effects and animations that use the curve to play with perspective and create convincing depth to the display, and the results in person are quite impressive. The screen is also mounted on a sliding rail setup, so you can fine-tune viewing angles after install. If you don't care about 3D, there's a split-screen mode that allows you to display custom images or art system stats instead.

> "Asus has really leaned into the naked-eye 3D effects and animations that use the curve to play with perspective and create convincing depth to the display, and the results in person are quite impressive."

The display is managed via Asus InfoHub which makes it easy to handle screen uploads, playlists and hardware telemetry. The Armoury Crate app still gives us mixed feelings when managing cooling profiles and Aura lighting on the fans, but once dialled in it's all very seamless.

Overall it's an amazing cooler, but value for money is a sticking point. With a street price around $599, it sits well above standard 360 mm AIOs that give just as competent cooling for a fraction of the price. Still, if you want premium performance combined with premium aesthetics, the Asus ROG Ryuo IV is one of the best AIO options available. ■

**SPECS** 360mm aluminium radiator; 3x 120 mm ROG RYUO IV MF-12C ARGB fans, 800 - 2650 RPM, 71.44 CFM, 5.45mmH2O; high performance pump, 1800 - 3200 RPM; 6.67in curved 2K AMOLED display; 200mm sleeved FEP tubing; Intel LGA 1851/1700 & AMD AM5/AM4 compatibility; 394 × 140 × 32 mm; 6-year AIO warranty, 2-year display warranty.

### VERDICT

★★★★½

A showy but high performance AIO cooler that will make you want to keep your tempered glass side panel squeaky clean so you can enjoy the 3D effects.

**LINDSAY HANDMER**

**PRICE** $327 **WEB** crucial.com

# Crucial X10 2TB Portable SSD

Less isn't more.

**We were impressed by the speed and sturdy design of Crucial's X10 Pro, and this cheaper version offers a greater choice of storage capacities than the Pro. Crucial quotes read speeds of up to 2,200MB/s and write speeds of 2,000MB/s, which matches the Pro, though it lacks its predecessor's hardware encryption option.**

We saw speeds approaching Crucial's quoted levels in our benchmark tests (1790MB/s write speeds, for example), but only because we used a USB-C port that supports the USB 3.2 Gen 2x2 standard. These aren't as common as the slower Gen 2 ports, so check your connected device's specification. Those who have connected devices with USB 4.0 ports will get even faster speeds from compatible drives like the Corsair EX400U, which can transfer at twice the rate.

The X10 is the same size as the X10 Pro but comes in a cheaper plastic case rather than an aluminium shell. The design is less angular with rounded corners and edges, while the lanyard hole that was on one corner now passes through the centre of one of the shorter sides. It comes with a 20cm USB-C-to-USB-C cable, which is a little short, and means that if you want to connect it to an old-style regular USB 3.2 port you'll need to find an adapter.

The plastic case means it can survive a three-metre drop on to a carpeted floor, while the Pro was only guaranteed to withstand two metres.

We'd still recommend buying the Pro version. Its hardware encryption comes in handy for ultra-sensitive files. Without it you'll have to use software to encrypt files. ■

## VERDICT

★★★☆☆

A fast external SSD if you have an available USB 3.2 Gen 2x2 port, but it suffers from losing hardware encryption without much of a price reduction.

**APC STAFF**

**SPECS** Available in 1TB, 2TB, 4TB, 6TB and 8TB capacities; USB-C 3.2 Gen 2x2 connector; Speeds up to 20Gbps; No software included; 9.9x50x65mm (HxWxD); 42g; Three-year warranty.

**PRICE** $369 **WEB** tinyurl.com/APC552eufy

# Eufy Smart Display e10

If you have the Eufy ecosystem it'll fit right in.

**The E10 from Eufy could be so much more. Right now, it's an 8in portable screen that syncs nicely with your Eufy home-security setup, and for that, it's great. You can use it as a tablet, mount it on a wall, leave it in its dock, or carry it around your home with you. It lets you answer your doorbell and check your security feeds whenever you want.**

However, it's only compatible with Eufy security products. This is in contrast to the H500, which has Matter integration giving it complete control over a wide range of smart-home devices from various brands. The E10 can't even work with Eufy's non-security devices, including its robo-vacs and other smart-home gadgets.

Still, for $369 you get a respectable tablet that does exactly what you need it to. Link it up to your Wi-Fi, and you can access your burglar alarm, smart doorbells, security cameras and smart locks, showing up to four security-camera feeds at any one time, and giving you control over the lot. It fires into life when a visitor presses your doorbell, and can sort camera recordings by recognising the faces of people in shot.

During testing, notifications arrived in less than a second, and pulling up video feeds was also pretty instantaneous. Battery life was very impressive. In our tests, it managed a whole week without needing a charge.

The E10 is an oddity. It has incredible potential if it worked with non-Eufy software. As it stands, it only makes sense if you already use Eufy's security system at home. ■

## VERDICT

★★★☆☆

This is the ideal accessory if your home is protected by Eufy's security, but look elsewhere if it's not

**APC STAFF**

**SPECS** 8GB storage, MicroSD card slot; 8in 1280x800-pixel screen; Wi-Fi 6 (2.4 or 5GHz); 1x USB-C; 139x201x16.5mm (HxWxD).

apc

HIGHLY RECOMMENDED

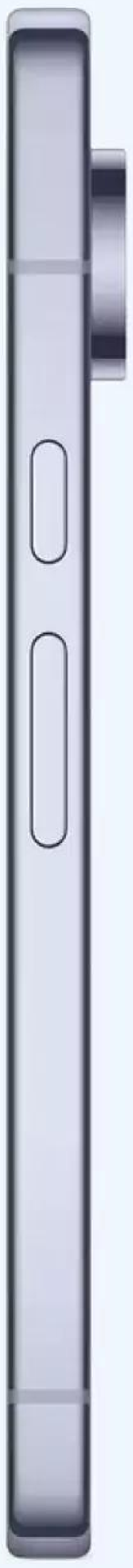
**PRICE** 256GB, $1,499 **WEB** store.google.com

# Google Pixel 10 Pro

## Steady as she goes, with no stumbles.

**I bought the Pixel 10 Pro on launch day as an upgrade from my trusty Pixel 7 Pro. The new phone has definite attractions if you're coming from a handset released back in 2022. For one thing, the physical design is completely different; this format was introduced last year with the Pixel 9 Pro, but it will still be a big change for anybody familiar with an older Pixel. It has a strikingly similar appearance to the iPhone 16 Pro, to the extent that my wife and I keep picking up one another's phones – but that's another way of saying it's one of the most premium-feeling, beautiful-looking handsets on the market. It's just a shame the colour options are so dull, with Obsidian, Moonstone, Porcelain and Jade finishes basically translating to black, grey, off-white and a sickly pale green.**

Recent Pixel Pro models no longer come with an extra large screen; if 6.3in isn't enough you'll need to pay at least $1,999 for the 256GB Pixel Pro XL and its 6.8in panel. But while the 10 Pro's display is of an ordinary size, it's extraordinarily bright, with a peak of 3,300cd/m2. It literally outshines rivals such as the Samsung Galaxy S25 Ultra (2,600cd/m2) and the iPhone 16 Pro (2,000cd/m2), and even beats the new iPhone 17 Pro, which tops out at 3,000cd/m2. This isn't something you notice every day – the phone sensibly keeps itself at a moderate setting when you're sitting around the house – but already a few times I've been out on the blazing sun, thinking "gee, it would be nice to check my phone right now", and to my amazement have found it perfectly legible.



### CAMERA PLUSES

One thing that initially excited me about the Pixel 10 Pro was the camera. The photographic hardware hasn't significantly changed in years, and I can't actually detect any difference in quality between photos taken on this and my Pixel 7 Pro. That's certainly not a complaint – they all look fantastic, with astonishing low-light performance. And I still adore the 5x optical zoom, which I've used many times to get beautifully framed nature shots that I couldn't have captured with another phone – not without resorting to the dreaded digital zoom.

Yet it's the digital zoom that makes the Pixel 10 Pro special, because while the hardware hasn't been meaningfully updated, the software has gained a new feature called Pro Res Zoom. This exploits AI more freely and creatively than ever before, to interpolate detail at high magnification levels and make bland, smeary blow-ups a thing of the past. It generates images that look sharp and natural all the way up to a ridiculous 100x zoom – something I couldn't wait to try.

Now that I've put it to the test, I have to say it's more of a party trick than a useful feature. It's hard to frame a decent photo from 100 metres away, and the zoom doesn't work as a handy telescope in your pocket because the fine detail is all invented, with text being morphed into weird alien glyphs. Even so, it's a lot of fun to push well beyond the limits of the optical zoom and still get nice-looking results, even if they're not a true representation of reality.

### AI SMARTS

For American owners, there's also a new voice-powered photo-editing feature that lets you dictate your desired adjustments to the on-device AI assistant. There's no word on when this will come to Australia, but I hope it's soon – it sounds like a smart bit of joined-up technology, taking the fiddly fat-fingered frustration out of removing the tourists from your lovely pictures.

Another bit of AI I'm enjoying is the Pixel screenshots app. Introduced last year with the Pixel 9 series, this not only puts all my screenshots neatly in one place, it lets me search their text, so I can instantly retrieve the measurements of those Ikea wardrobes I was looking at – as long as I remembered to take a snapshot of the website while browsing. That part might require me to update my habits, but again this is the sort of practical application of AI that I really dig.

It's worth mentioning that the Pixel 10 Pro comes with a year of Google AI Pro, giving you extended access to AI assistant features (including image and video generation), and unlocking AI tools in numerous Google apps. Your Google Drive storage is also upgraded to a huge 2TB – until the year runs out, at which point you'll have to decide whether it's worth $32.99 a month to keep it going.

PRICES OF GOOGLE PIXEL 10 PHONES

| | Pixel 10 | Pixel 10 Pro | Pixel 10 Pro XL | Pixel 10 Pro Fold |
|---|---|---|---|---|
| 128GB | $1,349 | $1,699 | Not offered | Not offered |
| 256GB | $1,499 | $1,849 | $1,999 | $2,699 |
| 512GB | Not offered | $2,049 | $2,199 | $2,899 |
| 1TB | Not offered | Not offered | Not offered | $3,289 |

**SPECS** 8-core Google Tensor G6 processor; 16GB RAM; Mali-G715 MC7 graphics; 6.3in 120Hz LTPO AMOLED screen, 1,280 x 2,856 resolution; 5G; 128GB/256GB/512GB/1TB storage; nano SIM and eSIM; IP68 rating; triple 50MP/48MP/48MP rear cameras; 42MP front camera; Wi-Fi 7; Bluetooth 5.3; NFC; 4,700mAh battery; USB-C 3.2 Gen 2 connector; Android 15; 72 x 8.5 x 153mm (WDH); 199g; 1yr warranty.

There are features of the Pixel 10 Pro I can take or leave. The new Camera Coach feature, exclusive to Pixel 10-series phones, is an okay idea, with the phone analysing your surroundings and suggesting shooting modes and styles for the best results. It's not a quick-fire thing, though – you need to spend a minute or two working through its suggestions, so it only really works with static scenes.

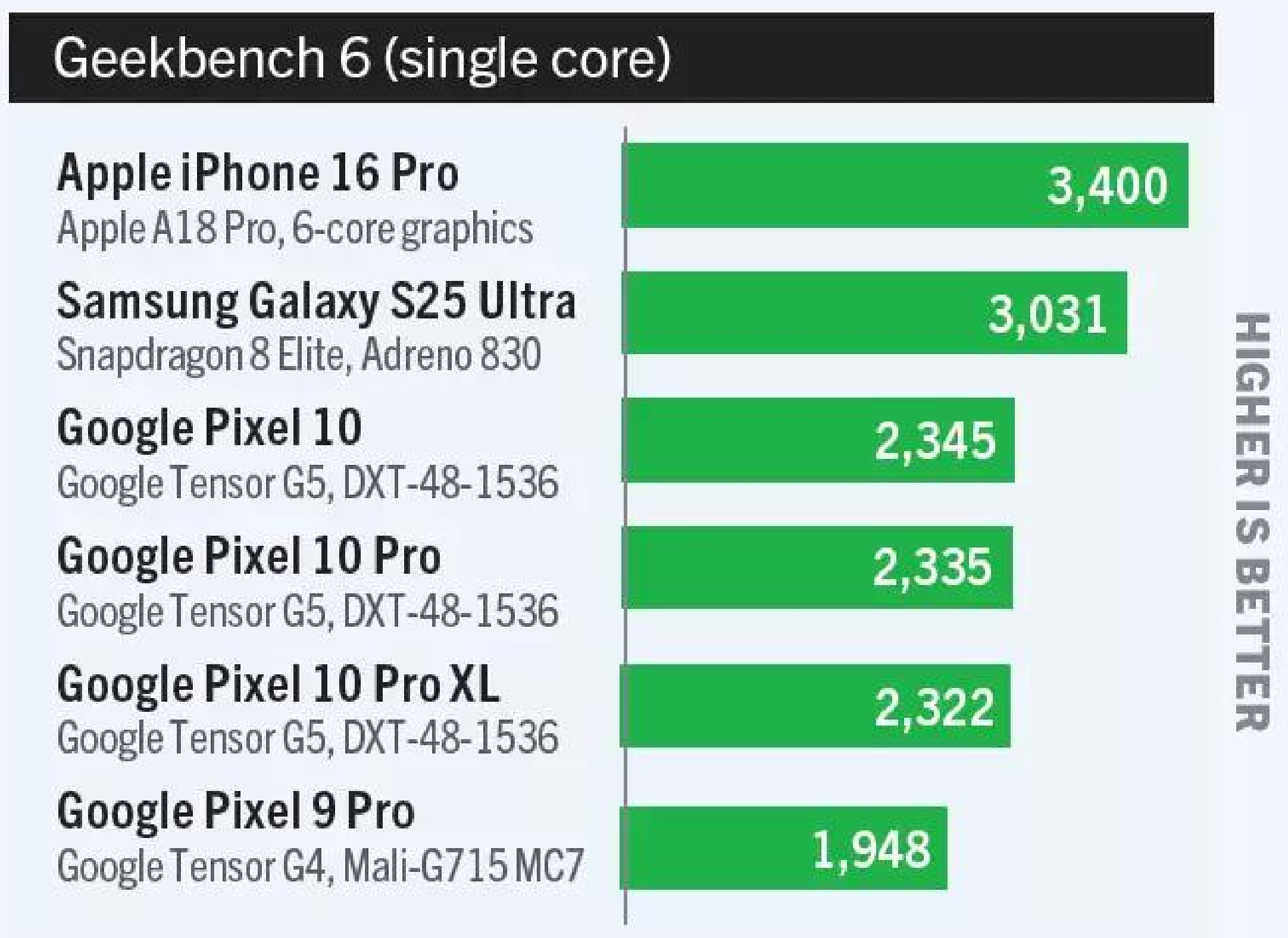
Another Pixel 10-only feature is Magic Cue, which is supposed to intelligently bring up content that's relevant to your communications. I turned this on from day one, but so far I haven't seen it pop up once. Google's marketing implies that Magic Cue is particularly useful for voice calls, when you don't want to be hunting through apps for information, so that might explain things; personally, I make very few calls, and when I do it's normally a quick one to say "did you see my email?" Anecdotally I hear I'm not the only one who's yet to see Magic Cue in action, but perhaps it will become more visible over time.

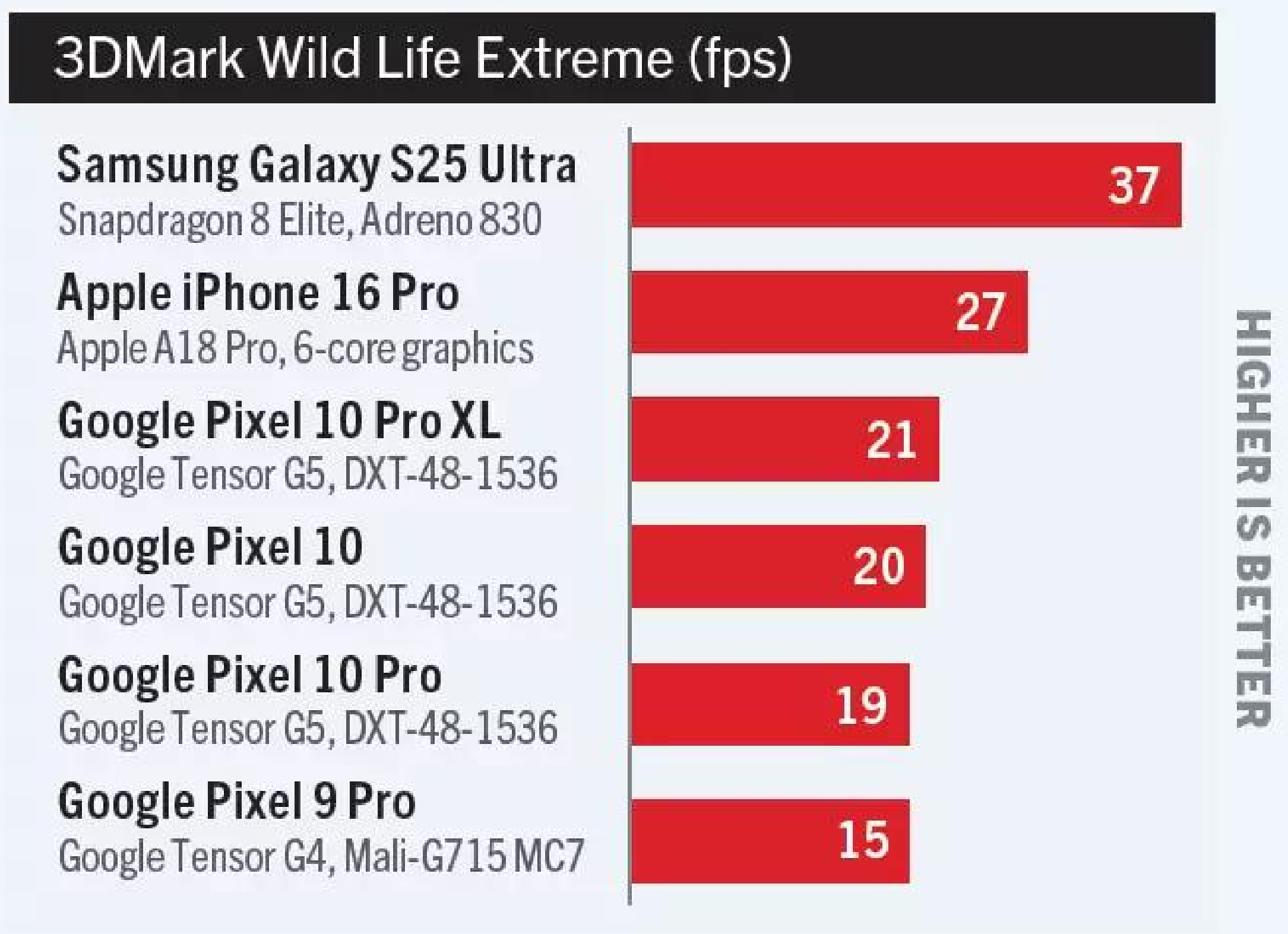
## HARDWARE TIMES

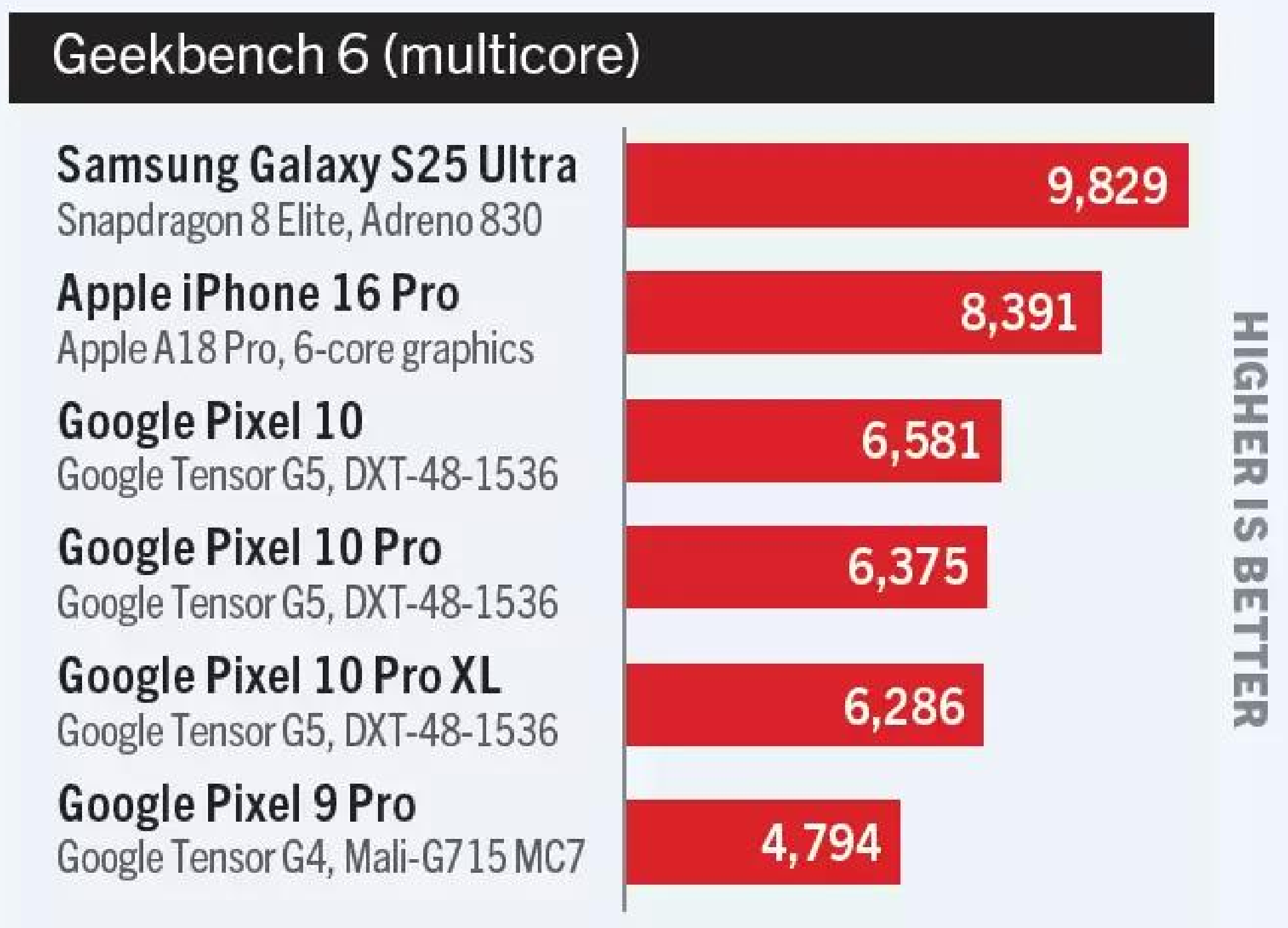
Let's talk next about the hardware that powers all Pixel 10 handsets: the new Tensor G5 processor, now shrunk down to three scintillating nanometres. Its benchmark scores are between 20% and 30% higher than the Pixel 9 Pro, but it's still nowhere near as fast as the Qualcomm chips in other high-end Android phones. Just glance at the graph above to see the gulf in both CPU and gaming performance.

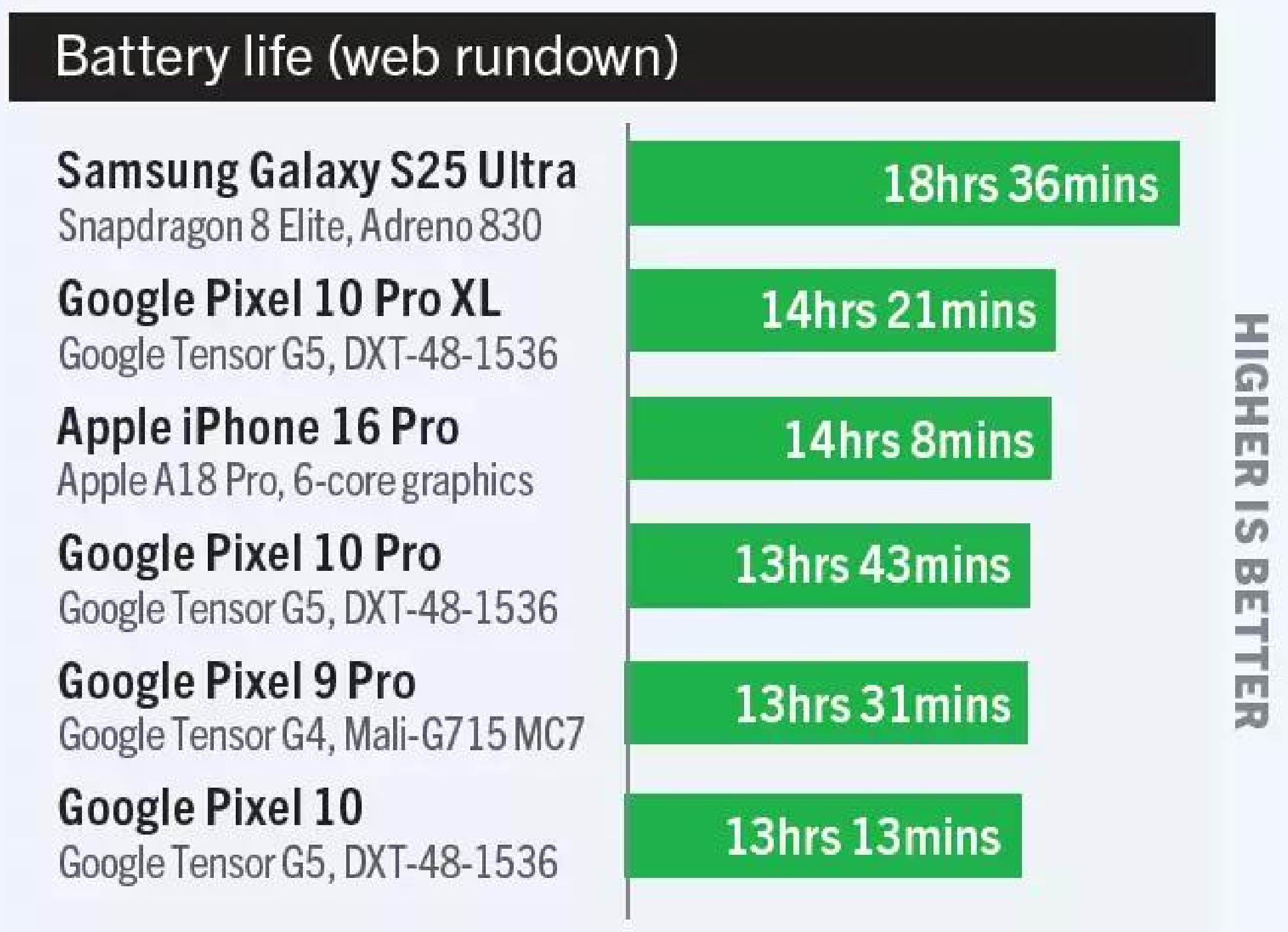
Yet while that's not a good look, I suggest you don't get too anxious about it. When you're actually running apps, or switching back and forth between them, the phone feels supremely snappy. If benchmarks didn't exist, I sincerely doubt that anyone would find a bad word to say about the Pixel 10 Pro's performance – unless perhaps they wanted to use it for 4K video editing or PlayStation-grade gaming.

Battery life is another case of "good enough". A full charge got me easily through a full day, even when I spent longer than I should flicking between *Gardenscapes* and *Threads*, so I'm happy about that. It's notable, however, that the Pixel 10 Pro conked out in our tests hours before its rivals; that suggests that battery life could become an irritation in three years' time, when the capacity has dropped to 80%.









> **"In the weeks I've been using the Pixel 10 Pro I haven't regretted my purchase once. Everything works smoothly and solidly"**

The recharging situation isn't exactly thrilling, either. The new Pixel range supports Qi2 wireless charging, which Google calls Pixelsnap (and Apple calls MagSafe) – the system where the wireless charger comes in the form of a round paddle, which snaps magnetically onto the back of your phone.

While having more charging options is never a bad thing, I'm not convinced that Pixelsnap is much more convenient than using a standard pad, or indeed just plugging a regular charging cable into the bottom of the thing – especially since the Pixel 10 Pro can only charge wirelessly at a maximum of 15W, whereas cable charging goes up to 30W.

Both of those numbers also feel rather low next to Samsung's 45W wired charging, while OnePlus's crazy SuperVOOC system goes as high as 100W. And it's not much consolation to note that faster speeds are available on the bigger, pricier Pixel 10 Pro XL. Is the Pixel 10 Pro supposed to be a "flagship" phone or not?

## THE GALAXY QUESTION

When you focus on specifics such as that, the Pixel 10 Pro does seem like a questionable investment. The 256GB model costs the same as the equivalent Samsung Galaxy S25 Ultra, yet lags well behind in performance, battery life and charging speed. Nor is the everyday experience much different to that of the Pixel 9 Pro, still available for the same $1,849 (256GB) and officially supported for another six years. As I say, I can't argue with the verdict of our podcast audience: "hot" is not the word.

All the same, in the weeks I've been using the Google Pixel 10 Pro I haven't regretted my purchase once. Perhaps the advertised gimmicks haven't translated to a massive uplift in my quality of life, but equally I haven't run into any infuriating gotchas, coercive marketing-led design decisions or penny-pinching compromises. Everything works smoothly and solidly, and that's not something you can say for every device. In my book it's justification enough to choose the Pixel 10 Pro over the competition – at least if you're someone who appreciates the Google way of doing things. ■

## VERDICT

★★★★☆

A limited upgrade over last year's model, but the new Pixel standard-bearer barely puts a foot wrong.

**DARIEN GRAHAM-SMITH**

**PRICE** 256GB, $1,499 **WEB** store.google.com

# Google Pixel 10

## Does everything most people need, very well.

apc
HIGHLY RECOMMENDED

**If the Pixel 10 Pro on the previous pages is too pricey, the regular Pixel 10 offers several of the same signature features for a lower fee, including magnetic charging and a 5x zoom camera. It also comes in a juicier selection of colours, namely Indigo, Frost and Lemongrass, as well as the sombre Obsidian.**

Its design is all but identical to this year's Pixel 10 Pro, to the extent that you can use the same case for either phone. The biggest difference from last year's Pixel 9 is that there are now internal magnets at the back, but these don't have any discernible impact on the phone's thickness or weight. You can't see the magnets, but you can feel them. Google has made its "Pixelsnap" feature – its variant on MagSafe – with very strong magnets, and the phone holds fast to the various Pixelsnap accessories even if you shake it around.

The display is one of the best you'll see on any smartphone; I don't think Google brags enough about the bright, clear screens on all of its Pixel phones. It's far brighter than the iPhone 16 or Galaxy S25, and is especially helpful for taking photos in bright sunlight. The display is just as colourful as the vibrant Pixel 10 Pro, so the only real difference is that it has a lower resolution, but I doubt you'd notice a difference. Overall, it's great for videos and games.

In fact, this phone is a pleasure to use in every situation. I found the homescreen easy to set up with app shortcuts and widgets, and I love the way Google's widgets automatically colour-coordinate to the theme of your phone. They even change to darker hues as the sun sets and night begins. The only bum note is the Settings interface, which remains a mess: you're faced with a jumble of disorganised features popping up in long lists of options. Still, it's worth the pain of digging through these  as otherwise you might miss out on AI features.

One major new feature is Magic Cue, which pops up pertinent information from your Gmail, Google Calendar and so forth at helpful moments. For example, if a friend sends you a text message asking about a dinner reservation, it might offer you a button to open the confirmation email or a link to the address on Google Maps. Or say your friend John wants to meet your friend Susan, Magic Cue will give you Susan's phone number and contact card to send to John. I can picture its capabilities expanding dramatically to become a major part of the Android experience.

The Pixel 10 also benefits from the new Live Translation feature, which translates your voice into another language over the phone while keeping your original tone. Other features are restricted to the Pixel 10 Pro, including automatically screening calls from unknown numbers and the (currently US-only) option to generate notes from live conversations. That concerns me: the Pixel 10 is supposed to receive seven years of Android updates, but on day one it's already missing out on features. What else will it be missing in a few years' time?

I have more positive news on the camera front. The Pixel 10 takes fantastic photos that look remarkably like images captured with the Pixel 10 Pro, which is one of the best camera phones you can buy. You don't get the same resolution, but the colour and tonal balance is superb. Even more exciting, the Pixel 10 includes the 5x optical zoom lens that was previously only available on Pro models, and the new AI-powered Camera Coach feature can help you learn to use it.

Inside, the Pixel 10 uses the same silicon as the Pixel 10 Pro. That means it's a slow phone by benchmark standards, but strangely it was faster than the Pixel 10 Pro in some tests, despite having only 12GB of RAM compared to 16GB. In any case, most users will never notice: for daily tasks and navigating the phone's menus, it felt zippy. Apps open quickly and the menus and homescreens flashed by as I swiped through them.

I did see slowdown when playing intense games: the phone stutters if you try to play *Call of Duty Mobile* with the performance settings maxed out, or if you run through *Vampire Survivors* with hundreds of enemies on the screen. Outside of those extreme scenarios, though, I didn't notice any performance problems.

As for charging, I'm a big fan of Pixelsnap for bedside charging – it's just so easy to pop your phone onto a magnetic stand at night. Once charged, the Pixel 10's battery usually lasted me through a full day of testing, unless I was hitting the Camera app extra hard. It did fall two hours short of the Samsung Galaxy S25 in our tests, but magnetic charging makes it easy to top up your phone throughout the day.

The Pixel 10 is a durable, functional phone that's easy to use and enjoy. It takes great photos and packs genuinely useful AI features. It's disappointing that it can't do everything the Pro model can, which is one big reason to choose the pricier model. However, if you're not concerned about ticking off every AI feature on the list then you can save a decent chunk of money and buy the Pixel 10 with confidence. ■

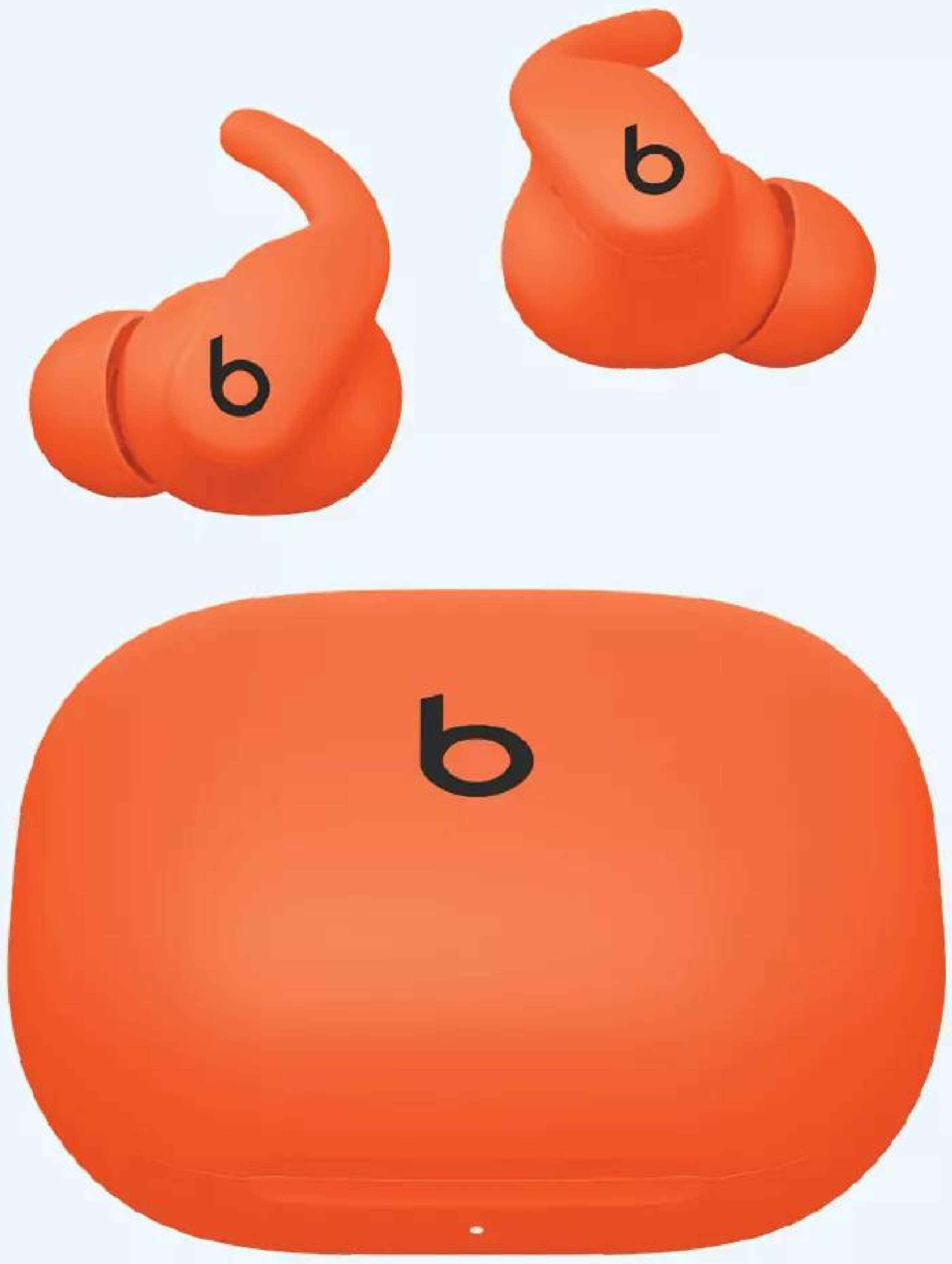
**SPECS** 8-core Google Tensor G5 processor; 12GB RAM; Mali-G715 MC7 graphics; 6.3in 120Hz AMOLED screen, 1,080 x 2,424 resolution; 5G; 128GB/256GB storage; nano SIM and eSIM; IP68 rating; dual 50MP/48MP rear cameras; 10.5MP front camera; Wi-Fi 6; Bluetooth 5.3; NFC; 4,700mAh battery; USB-C 3.2 Gen 2 connector; Android 14; 72 x 8.5 x 153mm (WDH); 198g; 1yr warranty.

**VERDICT**

★★★★☆

More affordable than the Pixel 10 Pro but very nearly as brilliant, even if it misses out on some AI features.

**PHILIP BERNE**



**PRICE** $329 **WEB** apple.com/au

# Powerbeats Fit

## Are these buds fit for fitness?

**The new Powerbeats Fit buds fulfill one key objective for fitness – they stay in place nicely. Each bud has a flexible fin that makes guiding them in intuitive, and even during vigorous exercise they stay firmly in place. A nice secondary design plus is having the controls built into each bud, so you won't need to pull out your phone to control things.**

They also look pretty sporty. I have the Spark Orange pair and they look super cool. You can also have Gravel Grey or Power Pink.

They're rated at IPX4, so it can handle a light spray but they aren't designed for being fully immersed. Bluetooth pairing was no trouble, and the ANC performed well.

But it all falls down with the audio quality. The sound is thin and light – not exactly conducive to power workout tracks. We all know Beats have a reputation for bass-heavy sound, so this was a big surprise. I wouldn't necessarily want 'typical' Beats big overwhelming bass from these, but they're so meek and mild-mannered that music just sounds plain and flat. Worse, there's no EQ available in the official app, so you're stuck with this weak sound profile. I did try different tip sizes, so it wasn't a sealing issue.

Compared to the Google Pixel Buds 1 and 2, the Beats just don't have any weight to the audio, so it's hard to recommend them to power your workout sessions unless you like soft, gentle music. ■

### VERDICT

★★⯪☆☆

A nice physical design let down by weak audio quality.

**BEN MANSILL**

**SPECS** Compatibility: iOS/Android, Bluetooth; Water Resistance: IPX4; Battery Life Case (Claimed): Up to 30 hours (ANC Off) / Up to 24 hours (ANC On), Battery Life Buds (Claimed): Up to 7 hours (ANC Off) / Up to 6 hours (ANC On); ANC: Yes. Weight: Buds: 5.78g, Case: 49.75 Total: 61.3g.

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apc
HIGHLY RECOMMENDED

**PRICE** $244 **WEB** dell.com

# Dell Pro Plus earbuds

## Earbuds that will appeal to multitaskers and business use.

**The Dell Pro Plus earbuds aim to tackle a problem only a few others can handle: the ability to connect to two different devices at the same time (and eight total) and automatically (or manually) switch between them.**

The Dell Pro buds are aimed at office use, but audio quality is decent for music on the train to work – especially if you customise the equaliser settings via the app. The earbuds include ANC that does a good job with background office noise and aircon hum, but you do need to make sure you use the best fit of the four included tip sizes.

The Dell buds include in ear detection, so will automatically trigger a pause if playing back video or audio files, plus there are touch sensitive controls on the side. You also get a USB-C dongle in the case for interoperability with computers without Bluetooth. The buds can be managed via the Dell Display and Peripheral Manager, or at scale by IT with the Dell Device Management Console.

The buds are certified for Microsoft Teams Open Office and Zoom, but no Google love yet – though they work just fine with Meet. The microphone quality is pretty good, and has an "AI" noise cancelling mode that does effectively cut background chatter.

The 66mAh batteries in the earbuds are rated for five hours talk and eight hours listening, both with ANC on. When recharged by the 500mAh battery in the case, they last up to 33 hours. In our testing the buds happily met this rating, though it will vary slightly depending on your exact usage. ■

### VERDICT

★★★★☆

Excellent productivity focused earbuds that offer rare multipoint connectivity.

**LINDSAY HANDMER**

**SPECS** Multipoint Bluetooth 5.3; ANC, 11.6mm drivers; in ear detection, touch controls, 4x eartip sizes, Battery: 66mAh earbuds, 500mAh case; run time up to 8 hours + 25 hours extra with the case; Dell Wireless Audio Receiver; 62.4 grams with case.

GROUP TEST

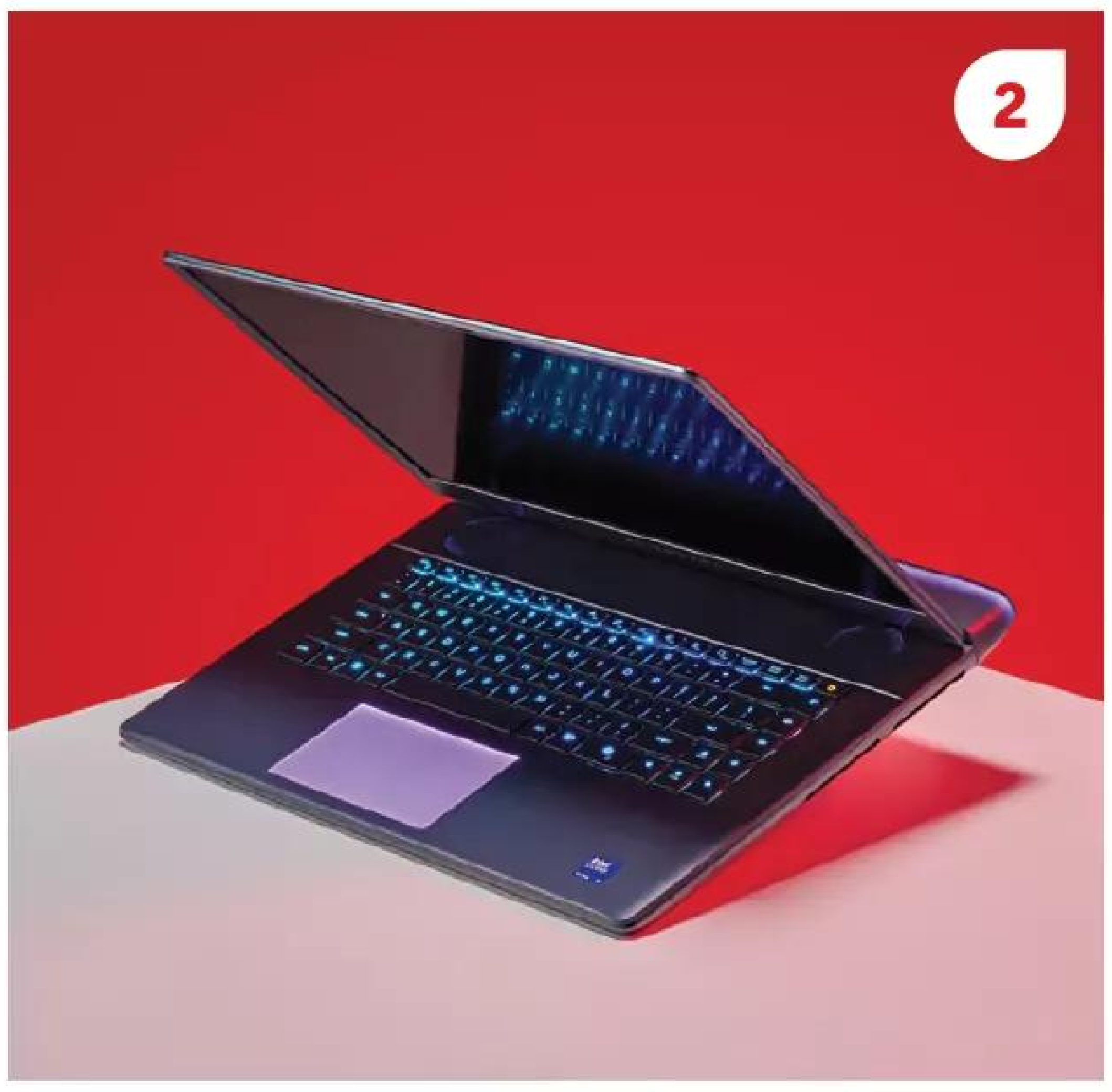
# Gaming laptops

Powerful, portable machines – gaming laptops are better than ever today.

BY JACOB RIDLEY

**Once upon a time, not that long ago, you'd be laughed out of a meeting or seminar for opening up a gaming laptop. I've had it happen to me, during my early days writing about hardware. I took a gaming laptop to an event filled with tech journos and was roundly made fun of when I had to desperately find a power outlet in a meeting room, of which there were none, to try and save my ailing battery and any semblance of my dignity. As gaming laptops have evolved, that's no longer something to worry about, though.**

1
apc
EDITOR'S CHOICE



3
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EDITOR'S CHOICE

# TUF A14 (2025)

## A bit of everything.

**PRICE** $2,799 **FROM** Asus

**1** The Asus TUF A14 has been reformed for 2025. It's largely the same laptop we've come to appreciate over the past year – not much has changed with the latest model. But it needn't have. Asus got a lot right with the TUF design, and this year's model adds an RTX 5060 and AMD Ryzen AI chip to help sweeten the deal. Slim and understated – two words not often used in correlation with 'gaming laptop'. Yet here is such a device and it wears it well. The screen will run up to 1600p and 165Hz, which is only really in range of the RTX 5060 at its core with help from Nvidia's Frame Generation feature, or at the very least DLSS. Though it looks sharp, crisp and bright for an IPS panel.

The standout feature for the A14 has to be the battery life. We saw well over two hours in the PCMark 10 gaming test, which is really spectacular considering the 73Wh battery in the TUF A14. It manages plenty of time away from the outlet nonetheless, which really makes this laptop a top pick for gaming and work.

**VERDICT**

★★★★½

**A sleek looker with all the essentials plus great battery life.**

**SPECS** CPU: AMD Ryzen AI 7 350; GPU: Nvidia RTX 5060 (110 W); RAM: 32GB LPDDR5X-7500; SSD: 1TB PCIe 4.0; Display: 14-inch IPS; weight: 1.46kg.

# 16 Area-51

## Somewhat otherworldly.

**PRICE** $5,540 **FROM** Alienware

**2** The latest Area-51 laptop lineup from Alienware is surprisingly in keeping with Alienware machines of yore. It's distinctly weird, but not in a cheap way. The screen juts out on a hinge, the underside has a glass window through which you can see… not very much. It's curvy and a little otherworldly in a way that I'm totally into. Smaller than the 18-inch monster we've also tested for this group test, the Alienware 16 is still nowhere near as svelte as TUF or Blade models from competitors. Though for its size, it packs a punch. The RTX 5080 inside this machine runs well with minimal fan whirr, and what noise it generates is consistent enough to not be distracting. There are a few things we'd like to see on this model to really make it one of the best. Personally, an OLED screen wouldn't go amiss, as Alienware has only adopted an IPS for this model. Though it is a vibrant panel and rated to 240Hz across a 1600p resolution. A good pairing with the RTX 5080 and Core Ultra 9 chip under the hood.

**VERDICT**

★★★½☆

**A bit unusual, in a good way. It looks good, though is quite bulky.**

**SPECS** CPU: Intel Core Ultra 9 275HX; GPU: RTX 5080 (175 W); RAM: 32GB DDR5-6400; SSD: 1TB PCIe 4.0 NVMe; Display: 16-inch IPS; weight: 3.4kg.

4
apc
HIGHLY RECOMMENDED

Offers a bright and vibrant OLED panel with an attainable 240Hz refresh rate

# Blade 14

## A lovely thing.

**PRICE** $4,147 **FROM** Razer

**3** This year's Razer Blade 14 is a big step-up from last year's. Whereas last year's model was as thick as Garfield, this year's model has been slimmed down. It's more befitting of the blade name, that's for sure. Razer has ditched removable memory to pave the way for the slimmer chassis, but it's importantly kept performance where it matters. That's important as it comes with a 2880 x 1800 resolution OLED screen, which looks great but requires some graphical grunt to get it operating at acceptable speeds. The 8GB RTX 5070 model of the Blade 14 that we reviewed sometimes falls short of that but is helped along massively by Frame Generation and DLSS. You have to spend big on a Blade 14, but the laptop feels worth it. It's no less the all-metal beauty we've come to expect from Razer's laptop line-up, albeit in a more practical size for gaming. Price is a big factor to consider here, however, as the similarly excellent Asus ROG Zephyrus G14 with an RTX 5070 Ti is available for similar money.

**VERDICT**

★★★★½

**Top quality construction and it looks superb. An eye-watering price, though.**

**SPECS** CPU: AMD Ryzen AI 9 365; GPU: Nvidia RTX 5070 (115 W); RAM: 32GB LPDDR5X-8000; SSD: 1TB PCIe 4.0 SSD; Display: 14-inch OLED; weight: 1.63kg.

# Legion Pro 7i

## To the max.

**PRICE** $5,497 **FROM** Lenovo

**4** If you want to get the most from your gaming laptop, the Legion Pro 7i is the best way to go about it. It holds nothing back. Lenovo has managed to push the RTX 5080 mobile found inside our review unit to such an extent that it actually beats out the RTX 5090 mobile in the Razer Blade 16. All the while keeping temperatures lower. Beyond raw performance, the Legion Pro 7i offers a bright and vibrant OLED panel with an attainable 240Hz refresh rate. Inside, it has two NVMe slots and removable memory for easy upgrades, alongside a 99.9 Wh battery. That upgradeability comes at the expense of a svelte form factor like some others in this group test, and that might put off some prospective buyers, as will the lack of lifespan away from an outlet. But for all-out gamers, it's the clear pick.

The downside is the price. We're used to the so-called Razer tax for its Blade machines, but less so Lenovo's even larger premium for this. Still, it makes light work of games, and that will surely count for a lot.

**VERDICT**

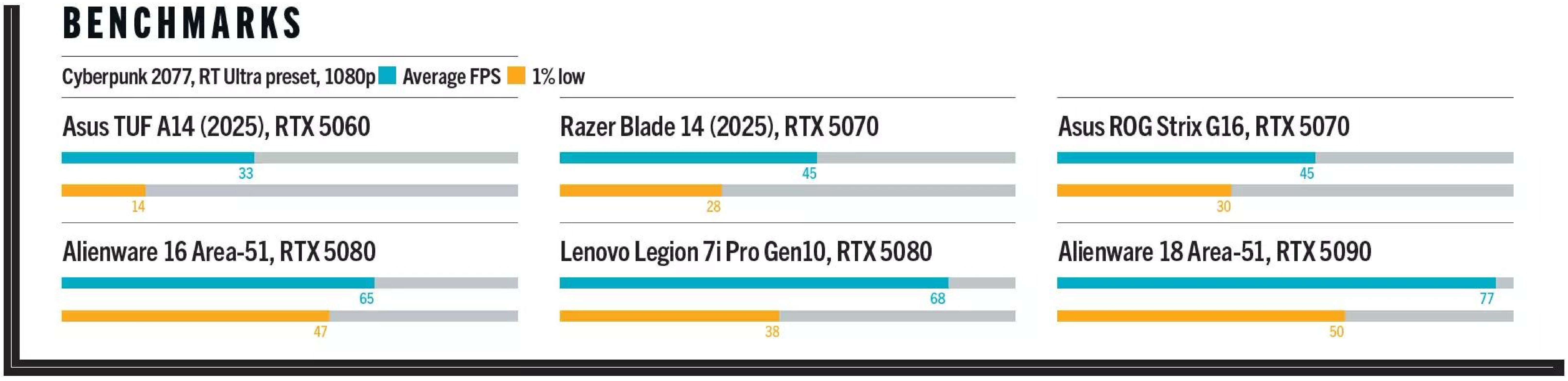
★★★★☆

**Top spec components and unbeatable performance, but is expensive.**

**SPECS** CPU: Intel Core Ultra 9 275HX; GPU: Nvidia RTX 5080 (175 W); RAM: 32GB DDR5-6400; SSD: 2x 1TB PCIe 4.0 SSD; display: 16-inch OLED; weight: 2.72kg.

5
apc
HIGHLY RECOMMENDED

6
apc
HIGHLY RECOMMENDED



# ROG Strix G16

## Time for an upgrade.

**PRICE** $5,297 **FROM** Asus

**5** If you're looking for a portable laptop you can take on the move, you'll be wanting to check out the Zephyrus G16, G14, or Blade 14 instead. The ROG Strix G16… it's chunky. The Strix has a party trick, made possible by its large chassis. You can pop the back off and upgrade some of the key components – memory, storage – without requiring any tools whatsoever. Push the sliding clip on the rear of the machine and off pops the entire underside of the laptop, exposing the neatest innards we've seen in some time. Most of the important bits are protected by further covers, though the twin SSD slots and memory are easily removed without any screws. Beyond that, the Strix G16 is fairly run-of-the-mill. The screen is an IPS, rather than OLED, but it is rated to 240Hz. That's tough going for the RTX 5070 model we reviewed without Frame Generation and DLSS coming to the rescue. I'd prefer the Zephyrus over this, but it depends on how you plan to use it. I wouldn't want to try to use the Strix on an aeroplane.

### VERDICT

★★★★☆

**Tool-free upgrades is a win. This laptop is big, and has a good screen.**

**SPECS** CPU: Intel Core Ultra 9 275HX; GPU: Nvidia RTX 5070 (115 W); RAM: 32GB DDR5-5600; SSD: 1TB PCIe 4.0; Display: 16-inch IPS; weight: 2.65kg.

# 18 Area-51

## Out of this world.

**PRICE** $7,274 **FROM** Alienware

**6** The Alienware 18 Area-51 looks and feels like an Alienware of old. It's high-end, almost classy, and yet keeps that otherworldly extravagance that older PC gamers will recognise anywhere. It's been a while since Alienware has put out a laptop we're really fond of, but the Area-51 is it.

With an RTX 5090, 64GB of RAM, and 2TB of storage, the Area-51 we got our humanoid hands on isn't sparing any expense. Unsurprisingly, then, the price tag is out of this world, too. Though it's only asking as much as most other similarly specced laptops, and there's a strong argument for siding with this extraterrestrial option for its top-notch performance.

It's not a perfect run for the Area-51. The keyboard is clicky, which is plenty responsive, but it feels cheap by comparison to others. The screen, capable of hitting a glaring 500 nits, doesn't support HDR. And there's a weird issue wherein the laptop's frame rate in games is capped to 30fps while on battery power, no matter what you tweak in the settings.

### VERDICT

★★★★☆

**Top cooling with high performance, slightly blighted by a weird FPS cap.**

**SPECS** CPU: Intel Core Ultra 9 275HX; GPU: Nvidia RTX 5070 (115 W); RAM: 32GB DDR5-5600; SSD: 1TB PCIe 4.0; Display: 16-inch IPS; weight: 2.65kg.

**SYSTEM-INFORMATION TOOL**

**NEEDS** Windows 10 or 11 **WEB** www.turkaysoftware.com/glow

# Glow 25.07

A detailed and well designed system analyser.

**Glow was one of the most popular program of 2024 – but its developer took a break for the first half of this year. The brilliant system-information tool is now back with a major update, which includes a host of new features, improvements and more insights into your PC's components.**

The most notable addition in Glow 25.07 is a new Installed Apps section. This lists all the programs installed on your PC, even those that don't appear in the Control Panel or Windows Settings Apps list. Although Glow doesn't uninstall software, you can double-click an item to open the folder containing that program.

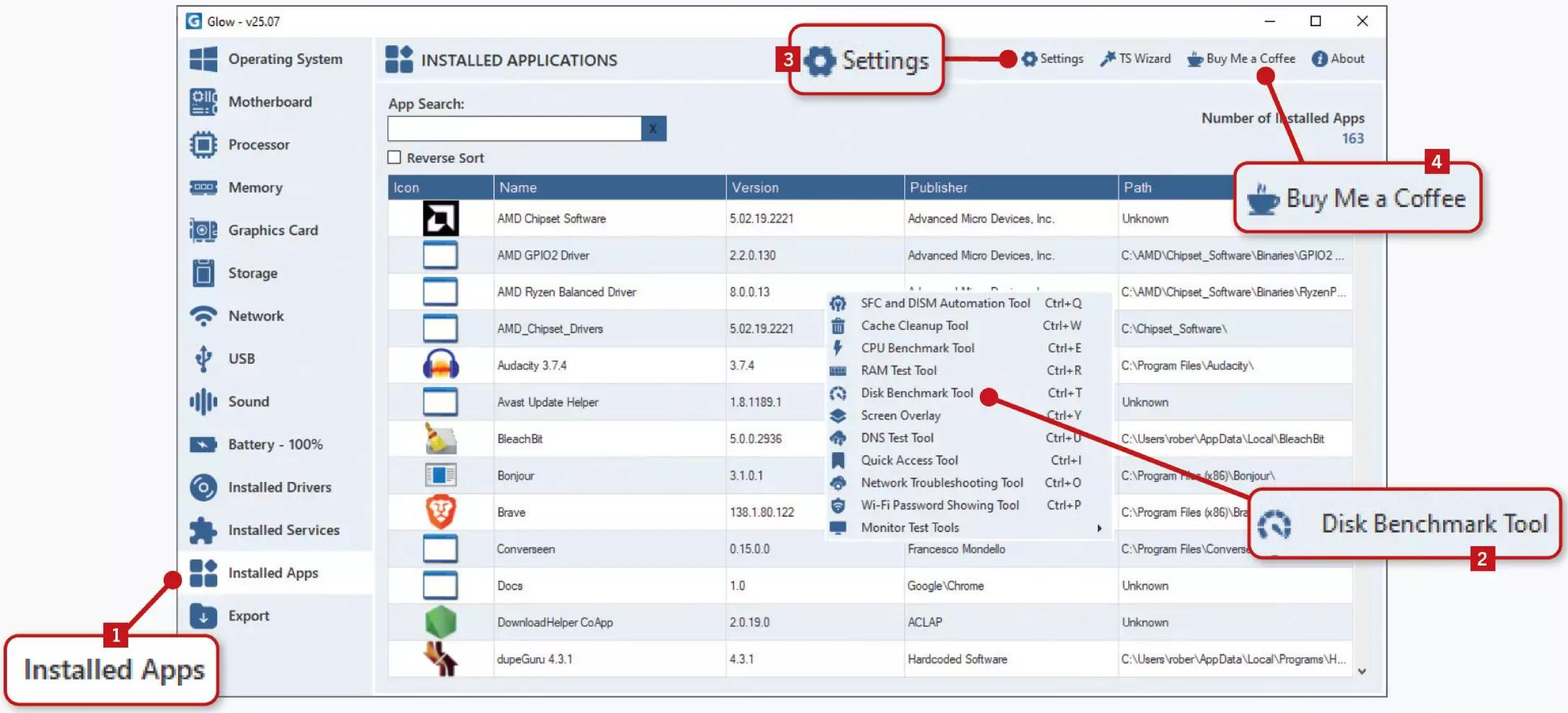
Glow's Tools menu – which contains useful options such as its RAM Test Tool, Wi-Fi Password Showing Tool and Monitor Test Tools – is no longer in the top-right corner, where it was becoming unwieldy as more tools were added. You can now access it more conveniently by right-clicking anywhere in the main interface.

The Processor section has been updated to support the latest Intel and AMD processors, while the Memory section detects new high-speed memory cards. If you have a multi-screen setup, Glow can now recognise and provide info for up to three monitors in its Graphics Card section.

Glow also has a new TS Wizard button in its top-right corner – TS stands for Türkay Software, the name of its developer. Clicking this opens the web page for TS Wizard – a suite for managing all the developer's programs. Although this suite updates Glow automatically, you can check for updates manually by clicking the Settings menu and choosing Check Update – or simply press F11.

Annoyingly, Glow 25.07 still triggers a warning from Microsoft Defender SmartScreen when you run its EXE file. It's completely safe to use, with a clean bill of health on VirusTotal (**tinyurl.com/APC552virus**), so click 'More info' then 'Run anyway'.

> "The brilliant system-information tool is now back with a major update, which includes a host of new features, improvements and more insights into your PC's components."


Glow - v25.07
Operating System
Motherboard
Processor
Memory
Graphics Card
Storage
Network
USB
Sound
Battery - 100%
Installed Drivers
Installed Services
Installed Apps
Export
INSTALLED APPLICATIONS
Settings
TS Wizard
Buy Me a Coffee
About
App Search:
X
☐ Reverse Sort
SFC and DISM Automation Tool Ctrl+Q
Cache Cleanup Tool Ctrl+W
CPU Benchmark Tool Ctrl+E
RAM Test Tool Ctrl+R
Disk Benchmark Tool Ctrl+T
Screen Overlay Ctrl+Y
DNS Test Tool Ctrl+U
Quick Access Tool Ctrl+I
Network Troubleshooting Tool Ctrl+O
Wi-Fi Password Showing Tool Ctrl+P
Monitor Test Tools
1 Installed Apps
2 Disk Benchmark Tool
3 Settings
4 Buy Me a Coffee

Number of Installed Apps 163

| Icon | Name | Version | Publisher | Path |
|---|---|---|---|---|
| | AMD Chipset Software | 5.02.19.2221 | Advanced Micro Devices, Inc. | Unknown |
| | AMD GPIO2 Driver | 2.2.0.130 | Advanced Micro Devices, Inc. | C:\AMD\Chipset_Software\Binaries\GPIO2 ... |
| | AMD Ryzen Balanced Driver | 8.0.0.13 | | C:\AMD\Chipset_Software\Binaries\RyzenP... |
| | AMD_Chipset_Drivers | 5.02.19.2221 | | C:\Chipset_Software\ |
| | Audacity 3.7.4 | 3.7.4 | | C:\Program Files\Audacity\ |
| | Avast Update Helper | 1.8.1189.1 | | Unknown |
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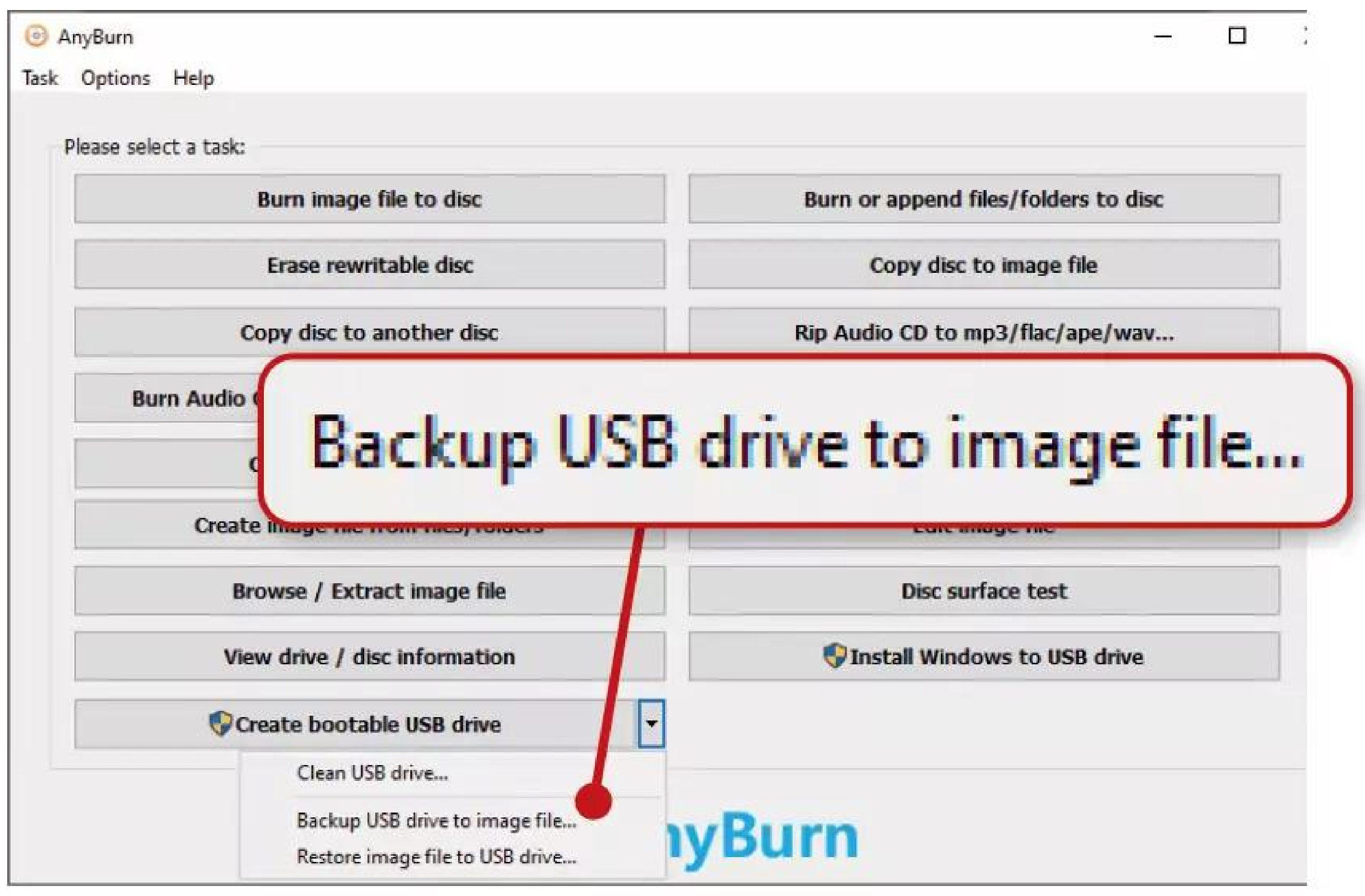
| | Bonjour | 3.1.0.1 | | C:\Program [illegible] (x86)\Bonjour\ |
| | Brave | 138.1.80.122 | | C:\Program Files (x86)\Bra |
| | Converseen | 0.15.0.0 | Francesco Mondello | C:\Program Files\Converse |
| | Docs | 1.0 | Google\Chrome | Unknown |
| | DownloadHelper CoApp | 2.0.19.0 | ACLAP | Unknown |
| | dupeGuru 4.3.1 | 4.3.1 | Hardcoded Software | C:\Users\rober\AppData\Local\Programs\H... |

**1** Glow's new Installed Apps section lists all the software installed on your PC. You can search for a specific program, view its version number and publisher, and double-click its name to open the folder containing its EXE file.

**2** You can now access Glow's Tools menu by right-clicking anywhere in the program. The menu includes the Disk Benchmark Tool, which measures the write and read speeds of a selected drive without overwriting any data.

**3** Click the Settings button to customise Glow's appearance. Switch between a dark and light theme, set it to open full screen or windowed, and use 'Hiding mode' to conceal private information from Glow's system analysis.

**4** Glow remains free to use, with no features restricted to a premium version. If you want to help support the program's development, you can click its new 'Buy Me a Coffee' button to make a small donation to the developer.

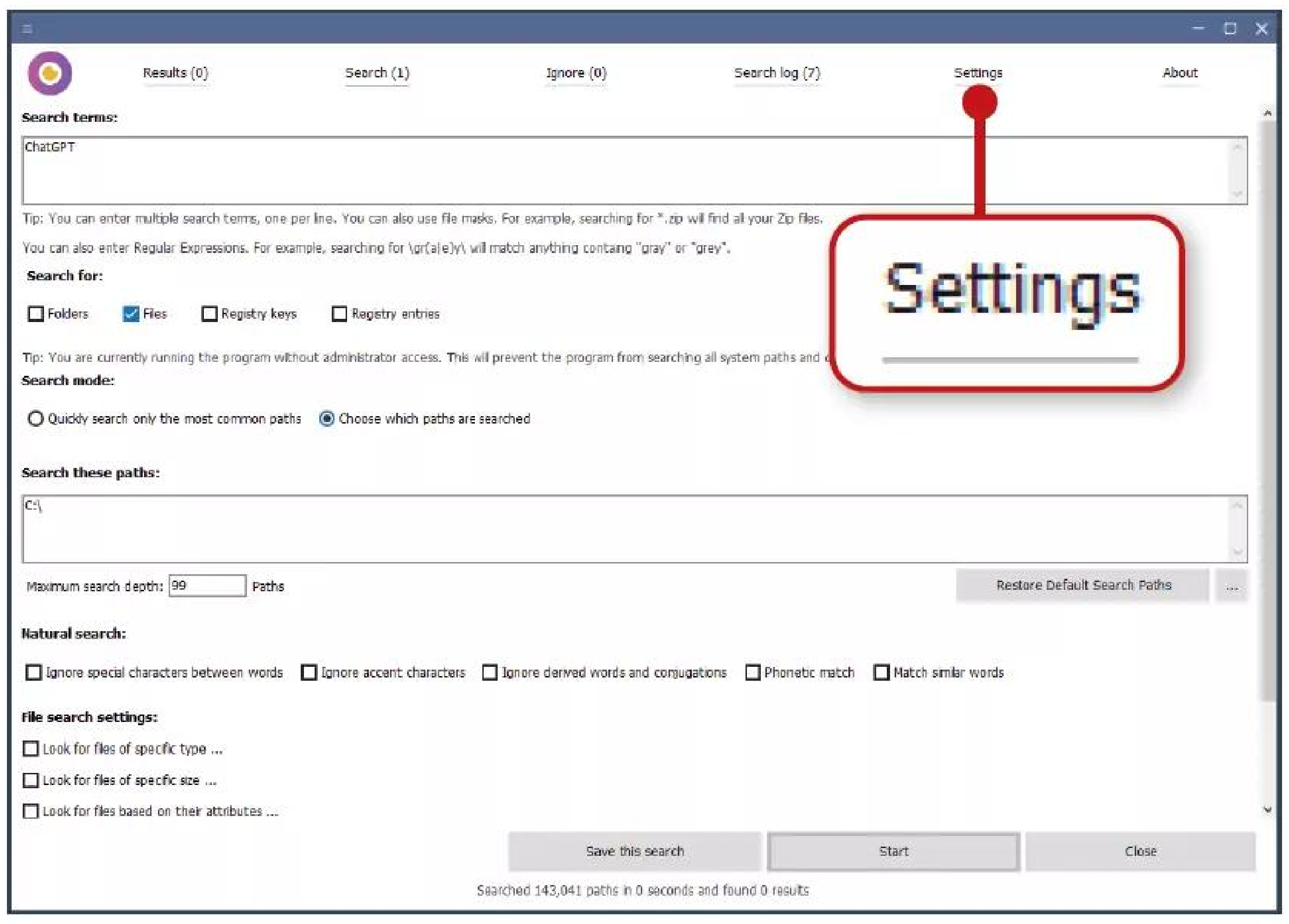

AnyBurn
Task Options Help
Please select a task:
Burn image file to disc
Burn or append files/folders to disc
Erase rewritable disc
Copy disc to image file
Copy disc to another disc
Rip Audio CD to mp3/flac/ape/wav...
Burn Audio
Browse / Extract image file
Disc surface test
View drive / disc information
Install Windows to USB drive
Create bootable USB drive
Clean USB drive...
Backup USB drive to image file...
Restore image file to USB drive...
AnyBurn
Backup USB drive to image file...

**DISC-BURNING TOOL**

**NEEDS** Windows 7, 8.1, 10 or 11 **WEB** www.anyburn.com

## ANYBURN 6.5

AnyBurn is best known as a tool for creating your own audio and data discs – by burning files on to CD, DVD and Blu-ray. This new version focuses on its support for USB drives, adding the option to write disk image files to memory sticks. An even handier new feature works the other way round, by creating image files of USB sticks. This lets you back up a removable drive's contents in case you lose it or it becomes unreadable. To access both new options, click the down arrow next to 'Create bootable USB drive' on AnyBurn's home screen. Select either 'Backup USB drive to image file' (see screenshot) or 'Restore image file to USB drive'. When backing up a USB stick, you can either use the default image-file format ISO or choose IMG or XDI format.


Results (0)
Search (1)
Ignore (0)
Search log (7)
Settings
About
Search terms:
Search for:
☐ Folders
☑ Files
☐ Registry keys
☐ Registry entries
Search mode:
○ Quickly search only the most common paths
● Choose which paths are searched
Search these paths:
Paths
Restore Default Search Paths
Natural search:
☐ Ignore special characters between words
☐ Ignore accent characters
☐ Ignore derived words and conjugations
☐ Phonetic match
☐ Match similar words
File search settings:
☐ Look for files of specific type ...
☐ Look for files of specific size ...
☐ Look for files based on their attributes ...
Save this search
Start
Close
Settings

Search terms: ChatGPT

Tip: You can enter multiple search terms, one per line. You can also use file masks. For example, searching for *.zip will find all your Zip files.

You can also enter Regular Expressions. For example, searching for \gr(a|e)y\ will match anything containg "gray" or "grey".

Tip: You are currently running the program without administrator access. This will prevent the program from searching all system paths and

Search these paths: C:\

Maximum search depth: 99

Searched 143,041 paths in 0 seconds and found 0 results

**SEARCH TOOL**

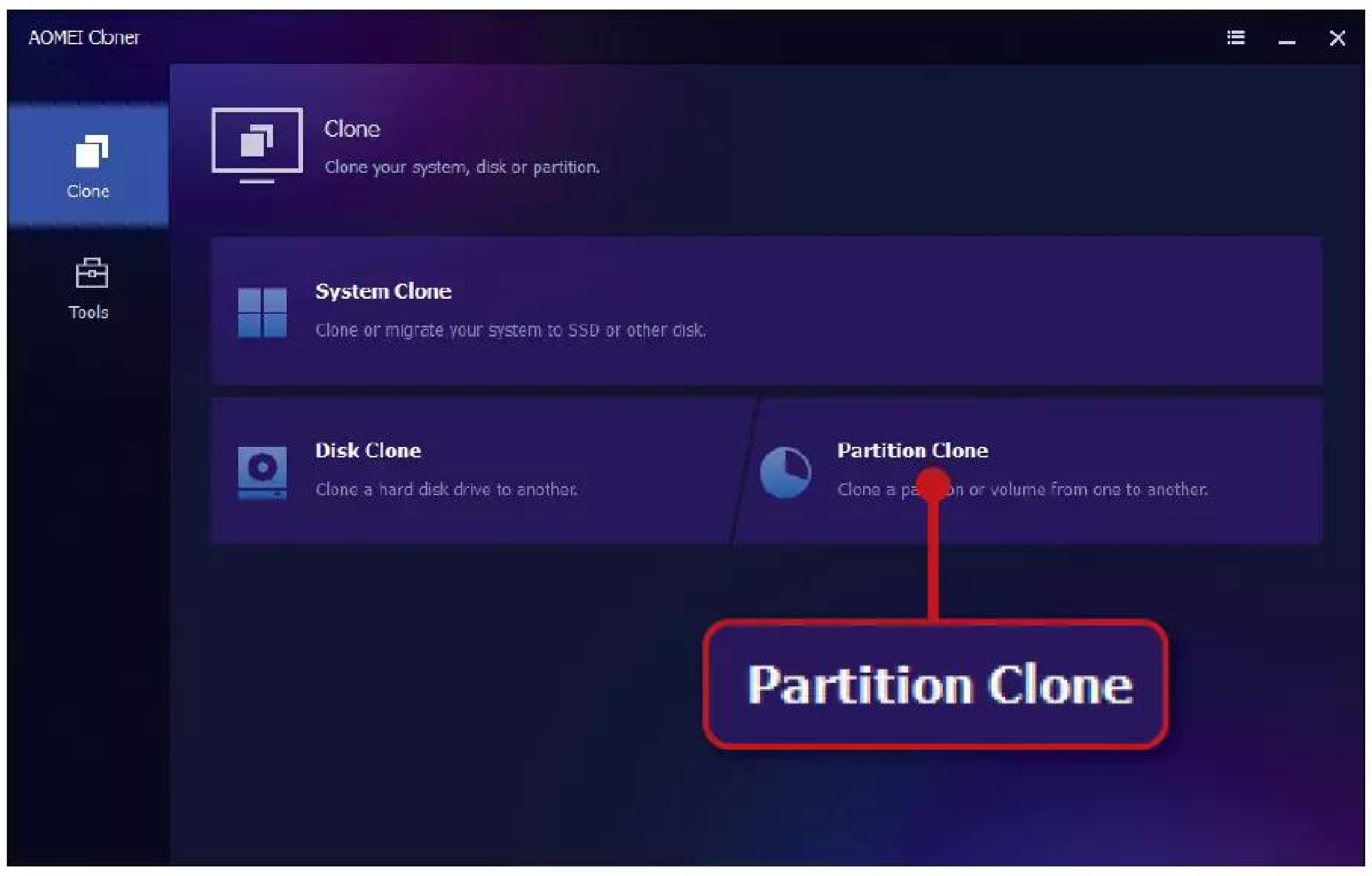
**NEEDS** Windows 7, 8.1, 10 or 11

**WEB** https://winfindr.com

## WINFINDR 1.8

From the developer of Uninstalr (**https://uninstalr.com**), this alternative to the built-in Windows search tool is more powerful than its basic interface suggests. It quickly scours your hard drives for files and folders (and registry keys, but it's best not to touch those), and lets you open the results by double-clicking them. As well as searching for file names, WinFindr can look for items of a specific type and size, and even search within documents, PDFs and ZIP archives. The latest version lets you minimise the program to your system tray and start it when you boot Windows – click Settings (see screenshot) and look under General Settings to find these new options. WinFindr works well but it doesn't make it easy to search within specific folders rather than entire drives or to filter its results by file type.

# Should I pay for?


AOMEI Cloner
Clone
Tools
Clone
Clone your system, disk or partition.
System Clone
Clone or migrate your system to SSD or other disk.
Disk Clone
Clone a hard disk drive to another.
Partition Clone
Clone a pa on or volume from one to another.
Partition Clone

**CLONER**

**PRICE** $59.95

**FREE TRIAL PERIOD** Yes, but with limited features

**NEEDS** Windows 7, 8.1, 10 or 11

**WEB** www.aomeitech.com/clone-software

## AOMEI CLONER

AOMEI Cloner is a new program from the company behind the popular backup software AOMEI Backupper (www.aomeitech.com/ab). Unlike that tool, it doesn't have a free 'Standard' version and its Demo only lets you preview its features and 'simulate operations'.

There are three of those operations to choose from. System Clone lets you clone your entire system, which is useful if you want to move it from a traditional hard drive to an SSD – or a larger or faster HDD. This saves you having to reinstall Windows and all your software, and retains all your files and settings.

The second option, Disk Clone, clones the contents of a hard drive to another one, while the third – Partition Clone (see screenshot) – does the same for individual partitions. There's also a tool for creating a bootable Windows emergency disk on a USB stick.

The beauty of AOMEI Cloner is how easy it is to use: its smart, minimalist interface puts a friendly face on the technicalities of cloning drives. Simply select what you want to clone and choose where to, and click the Start Clone button.

However, you get the same features from the free version of Hasleo Disk Clone (**tinyurl.com/APC552hasleo**), despite an article by AOMEI claiming the rival tool doesn't clone partitions (**tinyurl.com/APC552aomei**).

### OUR VERDICT: DON'T PAY FOR IT

We like the simplicity of AOMEI Cloner, but there's no point paying nearly $60 for features you can get for free. Even if you clone lots of drives and partitions, that's still a pretty steep price. ■

> "There are three of those operations to choose from. System Clone lets you clone your entire system, which is useful if you want to move it from a traditional hard drive to an SSD – or a larger or faster HDD."

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# BEST OF IFA 2025

## WE SHARE OUR 29 FAVOURITE PRODUCTS LAUNCHED AT THE "WORLD'S BIGGEST TECH EVENT" IN BERLIN.

**CONTRIBUTORS** Tim Danton with contributions from Erin Bashford, Cat Ellis, Jason England, Jon Honeyball, Cale Hunt, Tony Polanco

Every September the great and the good of the technological world descend upon Berlin for a riot of technology launches. Some live on in history, such as the first VCR in 1971 and the debut of the compact disc a decade later. Most have their moment in the sun before being cast into the eternal shade of history. And this year – well, we have a mix.

Perhaps the biggest news was the arrival of a Panther Lake laptop, while ThinkPad purists will likely go as white as the X9 Aura Edition's finish on seeing Lenovo move away from its purist black roots. Acer also claimed headlines for its sub-1kg Acer Swift 16 Air AI. We provide our first take of all IFA's new laptops over the page.

This is also proving to be a bumper year for mini PCs, and Acer again provided the debut for Nvidia's Grace Blackwell superchip in such a form factor. Although in truth these are workstations rather than PCs as we typically think of them, begging the question of whether you need ever go full tower size again.

There was room for fun this year, too. Tim played tennis with an AI robot (he refuses to say who won), we tried on the latest smartglasses and went retro with a 1980s-style boombox updated for the modern era. And even Jon Honeyball was impressed by Samsung's latest transparent OLED technology.

# MINI PCS & WORKSTATIONS

## ACER VERITON GN100

**PRICE** From $6,499 from acer.com
**AVAILABLE** Q1 2026

For now, this is as close as you're going to get to an AI supercomputer in your pocket. That's because it's based on Nvidia's ever-so-humbly named GB10 Superchip, which promises 1,000 TOPS for AI inference, around 31 TFLOPS of FP32 performance and 1 PFLOP performance at FP4 precision. Can it play *Doom*? Probably, and at around a million frames per second. But more importantly the Acer Veriton GN100 allows scientists, researchers and well-heeled students the opportunity to develop and run their own inference models on their own hardware. You can even connect two GN100 computers together to run in parallel, bringing AI models with up to 405 billion parameters into play. It runs on Nvidia's Linux-based OS, DGX, and comes pre-installed with its AI software stack to make it as developer-friendly as possible. Once you're ready to deploy to the cloud, it should be simple to do so (Nvidia promises) using DGX Cloud or similar. TIM DANTON

apc
BEST OF
IFA 2025

## ACER CHROMEBOX MINI CXM2

**PRICE** $TBA from acer.com
**AVAILABLE** TBC

Tight on space? Hate fan noise? Despise spending wads of cash on new computers? Well you should rub your hands with glee at the thought of Acer's new budget Chromebox, which is less powerful than the CXI6 (see right) but more than capable of lightweight tasks thanks to Intel's four-core Processor N150; higher-spec models are available. It's well connected thanks to Wi-Fi 6E, 1GbE wired networking and a generous sprinkling of HDMI and USB ports, all packed into a slim black box that's very much designed for tucking behind a monitor and out of view. TIM DANTON

## GEEKOM A9 MEGA

**PRICE** US$1,899 from kickstarter.com
**AVAILABLE** Q1 2026

The A9 Mega took pride of place on Geekom's stand at IFA, as well it should. Like the HPE Z2 mini workstation, but at a much lower price, it packs an AMD Ryzen AI Max+ 395 CPU and 128GB of RAM, opening up the possibility of running huge LLMs locally. Or simply playing games, with Geekom luring prospective buyers with the prospect of "seamlessly" running *Cyberpunk 2077*, *Eden Ring* and *GTA V* with ray tracing. Judging from the heat output I felt from the rear fans this thing will eat watts for breakfast, but who cares when it's in a box that measures 171 x 171 x 71mm? And there's still room for up to 8TB of storage. Look out for the Kickstarter campaign where you can back it for US$1,899, but we don't have a firm delivery date yet. TIM DANTON

apc
BEST OF
IFA 2025

## ACER CHROMEBOX CXI6

**PRICE** $TBA from acer.com
**AVAILABLE** December 2025

It's always interesting to see the evolution of mini PCs. This tiny box packs one of Intel's highly capable Core 100U processors – right up to the Core 7 150U. This lifts it well above the CXM2 to the left, as does a fast 2.5GbE port to accompany Wi-Fi 6E. A fast PCIe M.2 SSD helps speed things along, too. You can even connect four monitors thanks to two HDMI outputs, a DisplayPort and a USB-C port. It's still compact enough to easily fit behind a monitor, while a Chrome Enterprise Upgrade will be available, which also brings extra support and useful management features. TIM DANTON

# LAPTOPS

## ACER CHROMEBOOK ENTERPRISE PLUS SPIN 514

PRICE **$TBA from acer.com**
AVAILABLE **Q4 2025**

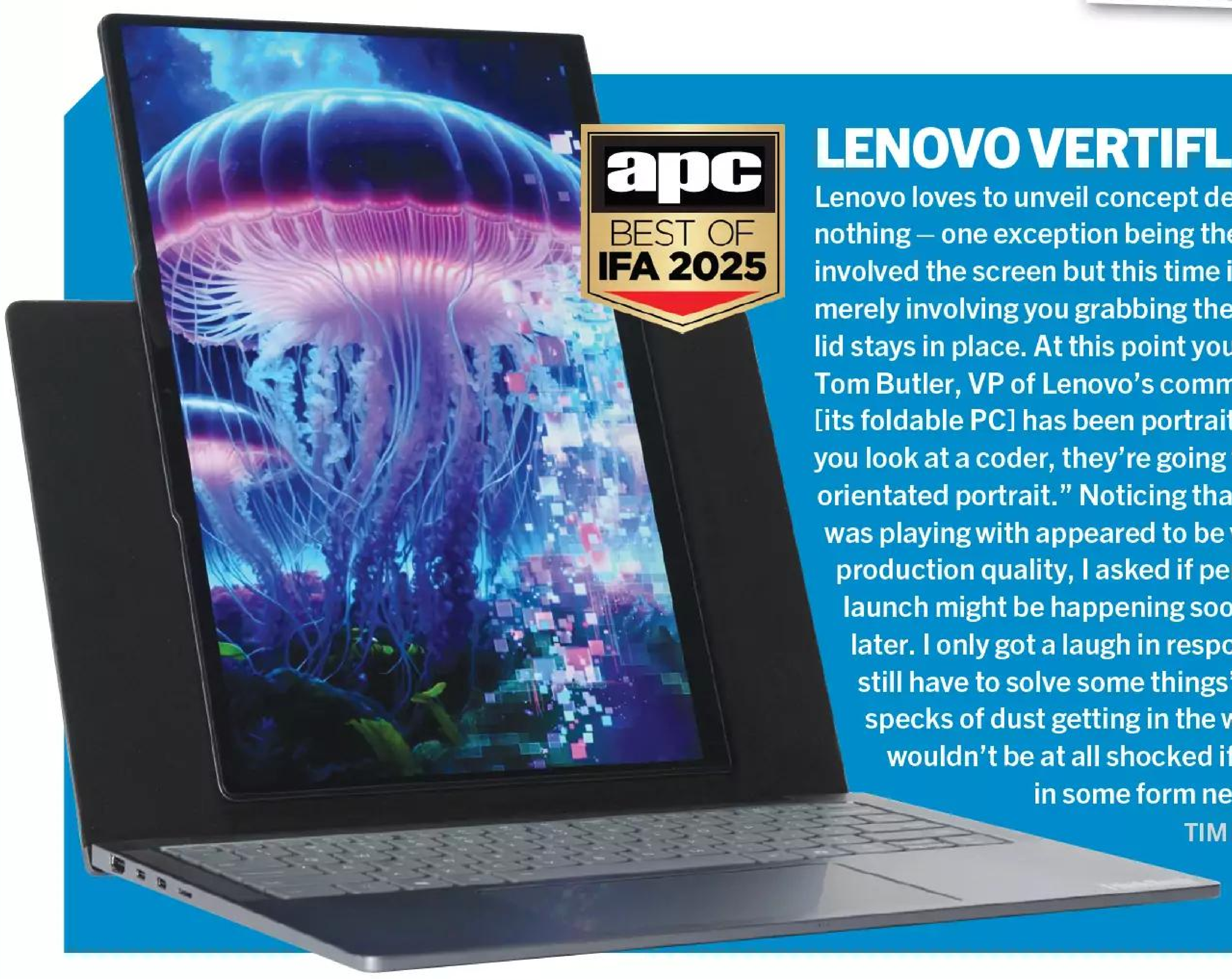
Walking into the large hall containing every one of Acer's 25 products announced at IFA, I had no intention of stopping at the Chromebooks section. But there's something about the Plus Spin 14 that lifts it apart from the chasing pack, whether it's the chrome edges on the lid or the shiny metal hinges. Acer has everyday consumers in mind for the plain Plus Spin 14 edition, while it hopes to lure businesses and education buyers with the Enterprise version (which comes with extra support and manageability). Both feature local AI thanks to the MediaTek Kompanio Ultra 910 chip, while a high-quality 14in touch panel, up to 16GB of RAM and 256GB of storage, and a claimed 17-hour battery life round out its attractions. TIM DANTON

## ACER SWIFT 16 AIR AI

PRICE **From $TBA from acer.com** AVAILABLE **TBC**

Hmm. Or, as I might type that on the Acer Swift 16 Air AI keyboard, hmfxpphy, for its keys are so close together that typos are surely inevitable. But this is only my view. You may love Acer's "reimagined" keyboard, with its lattice arrangement and incredibly striking design. Nor should I ignore the incredible feat of fitting in AMD's powerful Ryzen AI 300 chips, up to 32GB RAM, up to 1TB of storage and a glorious 16in AMOLED panel into a chassis that weighs under 1kg. Acer reckons you can get up to 13 hours of battery life, too, but in real-world use I suspect that will drop to single figures.

Let's wait and see what we find after a full review. TIM DANTON



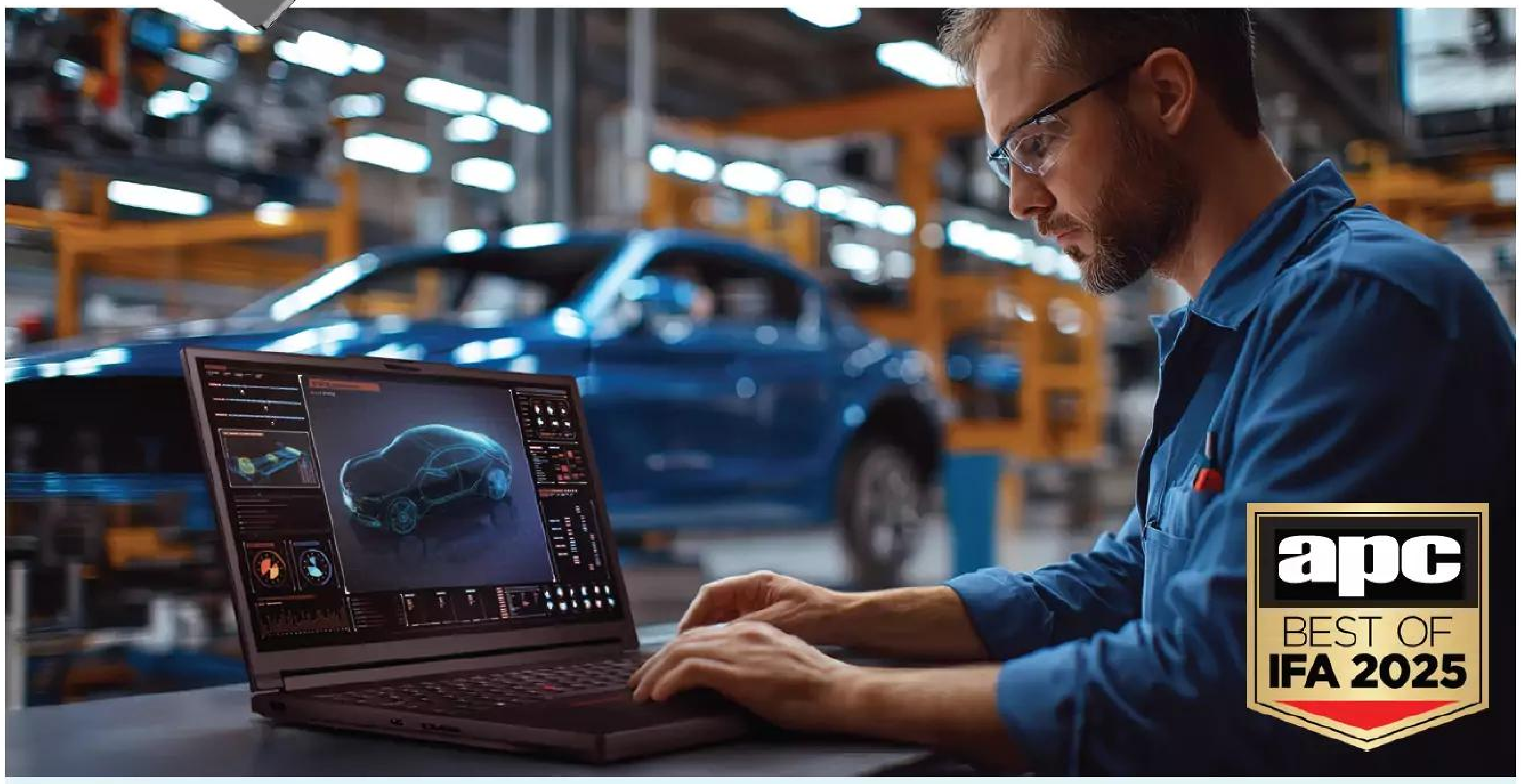
## LENOVO VERTIFLEX CONCEPT

Lenovo loves to unveil concept devices at the big trade shows, and most of them come to nothing – one exception being the ThinkBook Rollable. At IFA this year, the idea once again involved the screen but this time it rotates in situ by 90 degrees. It's a simple mechanism, merely involving you grabbing the panel by the corners and rotating it; the backplate of the lid stays in place. At this point you may be asking yourself "why?", which is what I asked of Tom Butler, VP of Lenovo's commercial portfolio. "The number one posture of the X1 Fold [its foldable PC] has been portrait mode because of the productivity gain," he told me. "If you look at a coder, they're going to have a monitor orientated landscape and a monitor orientated portrait." Noticing that the laptop I was playing with appeared to be very close to production quality, I asked if perhaps this launch might be happening sooner rather than later. I only got a laugh in response, and a "we still have to solve some things" (such as specks of dust getting in the way), but I wouldn't be at all shocked if it lands in some form next year. TIM DANTON

## ACER TRAVELMATE X4 14 AI

PRICE **From $2,499 from acer.com**
AVAILABLE **Q4 2025**

Okay, I admit it: compared to the Panther Lake-packing Acer Swift 16 AI or sub-1kg Acer Swift 16 Air AI the TravelMate X4 14 AI (TMX414-51) is dull. An instant conversation-stopper. But it's also an affordable route into AI/Copilot+ laptops for small to medium-sized businesses, with the promise of "enterprise-grade security" along with Intel's familiar Lunar Lake Core Ultra 200V chips. It weighs a travel-friendly 1.3kg and is 15.9mm thin, while the 14in screen is available in IPS and OLED versions. And it packs all the usual ports, including a pair of Thunderbolt 4 connectors. TIM DANTON



## LENOVO THINKPAD P16 GEN 3

PRICE **US$2,249 lenovo.com** • AVAILABLE **Q4 2025**

If you need creative power on the go then Lenovo is hoping its redesigned ThinkPad P16 might just catch your eye. This third generation is both lighter and slimmer than its predecessor, measuring a trim 20.9mm at the front and a rather beefy 29.8mm at the rear. That height, and the 2.5kg weight, are both more than justified by what Lenovo packs within: Intel's powerful Core Ultra 200 HX series processors with up to 24 cores, while memory peaks at 192GB and storage at 12TB (via a trio of 4TB drives). But it's Nvidia's RTX Pro 5000 Blackwell GPUs that will surely set pulses racing, bringing complex 3D rendering tasks into the fold – as shown in the image above, although quite why he's typing sideways is another matter. TIM DANTON

## INTEL GIVES PANTHER LAKE DEBUT WITH ACER SWIFT 16 AI

I'm not suggesting that Intel is betting the farm on Panther Lake, but the combine harvester and outhouse are definitely up for grabs. This is its successor to Lunar Lake, aiming to deliver multicore speed, superb battery life and top-notch AI skills in one package, and Jim Johnson, head of Intel's Client Computing Group, joined Acer CEO Jason Chen during his IFA keynote to announce that the Acer Swift 16 AI would be among the first to debut the chip.

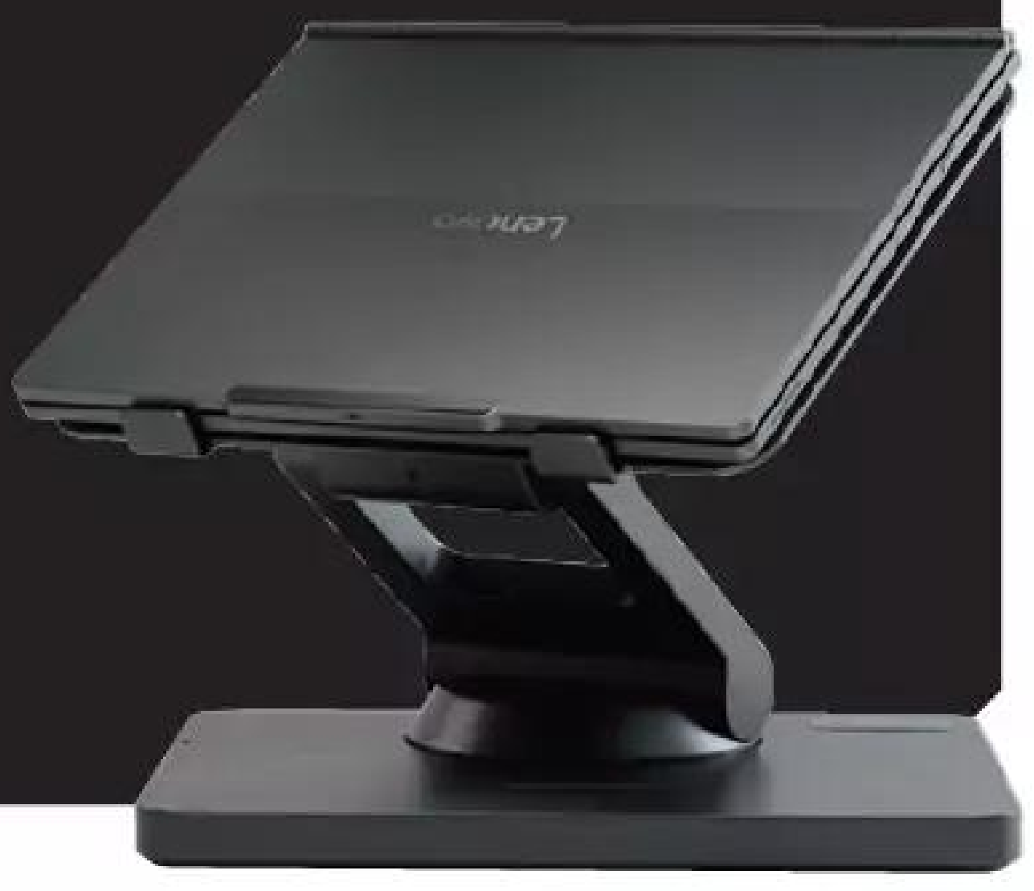
We've already seen a Core Ultra 200V version of this super-slim 16in laptop, which packs in a top-quality OLED panel and offers around 13 hours of battery life. Panther Lake will be the third generation of Core Ultra chips, and promises even greater AI chops thanks to more powerful graphics and the fifth generation of Intel's NPU.

"It's a beautiful machine and I can't wait until we launch this product together," said Johnson. "It's going to become the playground for unbelievable creativity and creation using AI tools and new hardware."

In particular, Intel is pushing its own AI Assistant builder. These are ChatGPT-like bots that run locally on your device, so rather than uploading personal data to the cloud you keep everything on one machine. Johnson also pushed the idea of AI agents. "So you can use your local data and then go out and get things done," he said. "For example, if you and I are travelling, we can use our local data from our calendar and subject matter, but then use APIs to book our travel, book our rooms, book our hotels." TIM DANTON

## LENOVO SMARTMOTION CONCEPT

I use a laptop stand at home and the office, so I was keen to give this concept a try. It uses motors to move up, down and side to side. The system integrates with a laptop camera, microphone and speakers to deliver auto-facial tracking and voice control. You can use gesture control, too. The stand rotates between 120 to 180 degrees, so it has a limit, but it can be handy to have a device follow you, particularly during virtual classes or presentations where you want to show something to whoever you're engaging with while staying in the frame. TONY POLANCO



## LENOVO THINKPAD X9 AURA EDITION GLACIER WHITE

PRICE **14in $2,040 from lenovo.com**
AVAILABILITY **Q4 2025**

No need to string this one out: Lenovo has released its first ever white ThinkPad. This 1.3kg, 14in laptop is aimed at younger audiences who may otherwise lean towards MacBooks and have no use for a TrackPoint. It's a sleek and fast machine up to all the usual ThinkPad standards, bar for its matte white finish – which I can confirm looks great and proved resistant to fingerprints. Lenovo is also releasing a white version of the 15in version of the X9, but both, I was told, will be "very short" production runs, so get in there quick if it sounds white up your street. TIM DANTON

# PHONES & TABLETS

apc
BEST OF
IFA 2025

## TCL NXTPAPER 60 ULTRA

PRICE **From $814 from amazon.com/au**
AVAILABILITY **Now**

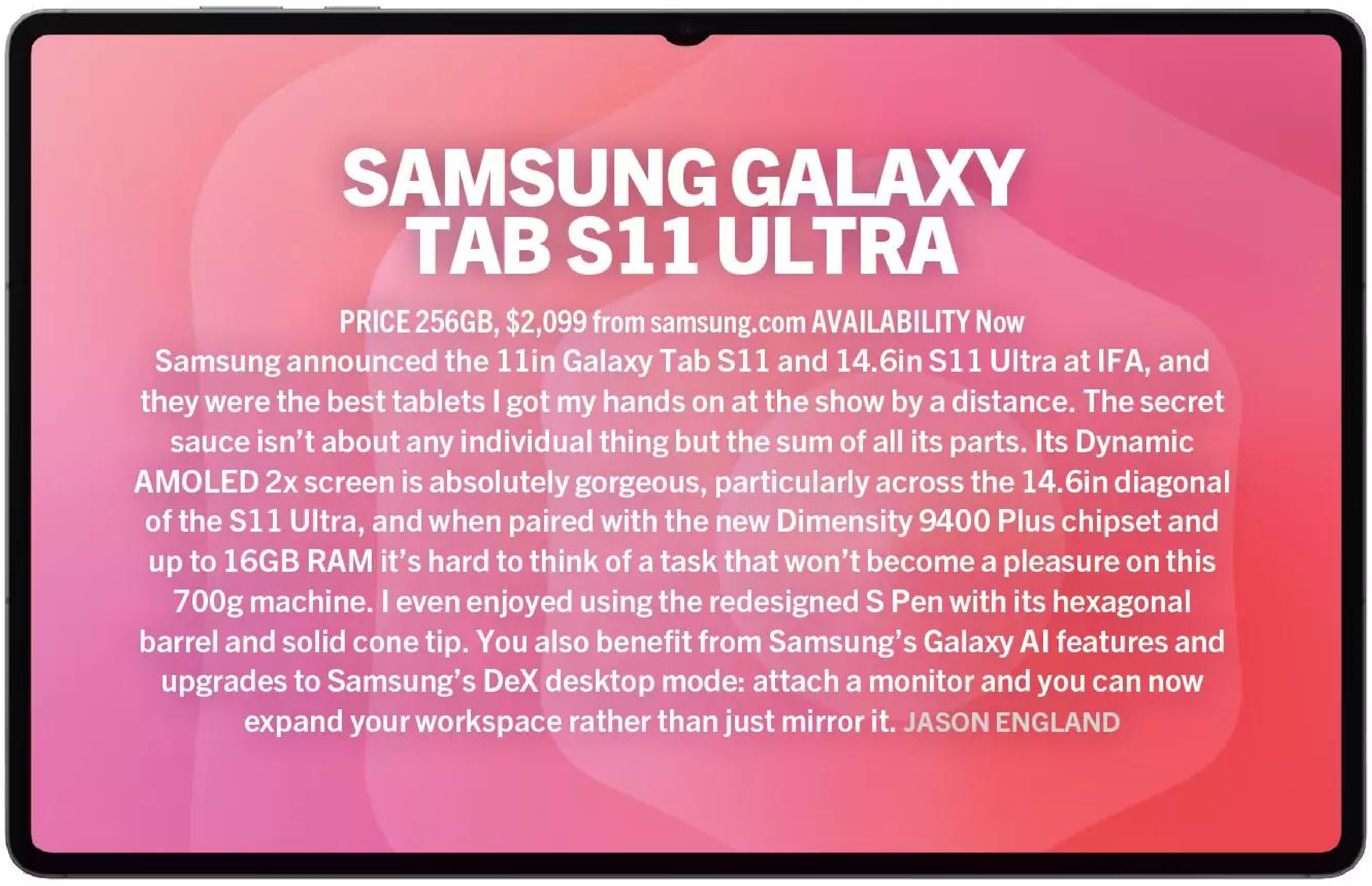
I'm already a fan of TCL's Nxtpaper technology, which shifts from matte colour to a Kindle-like black and white at the press of a button. This fourth iteration appears to be the best yet, with numerous promises about eye care to avoid screen fatigue. The 60 Ultra's 7.2in screen makes this a natural choice as a Kindle alternative, and while the phone is inevitably big I still slipped it into my pocket easily enough; you won't look stupid using it to make a call. I'll wait to give my verdict on the new zoom camera, the promised AI features and the speed of the MediaTek Dimensity 7400 processor, but all the signs are very promising. TIM DANTON

Thu, Apr 23
11:35

## MOTOROLA G06 POWER

PRICE **$TBA** AVAILABILITY **TBA**

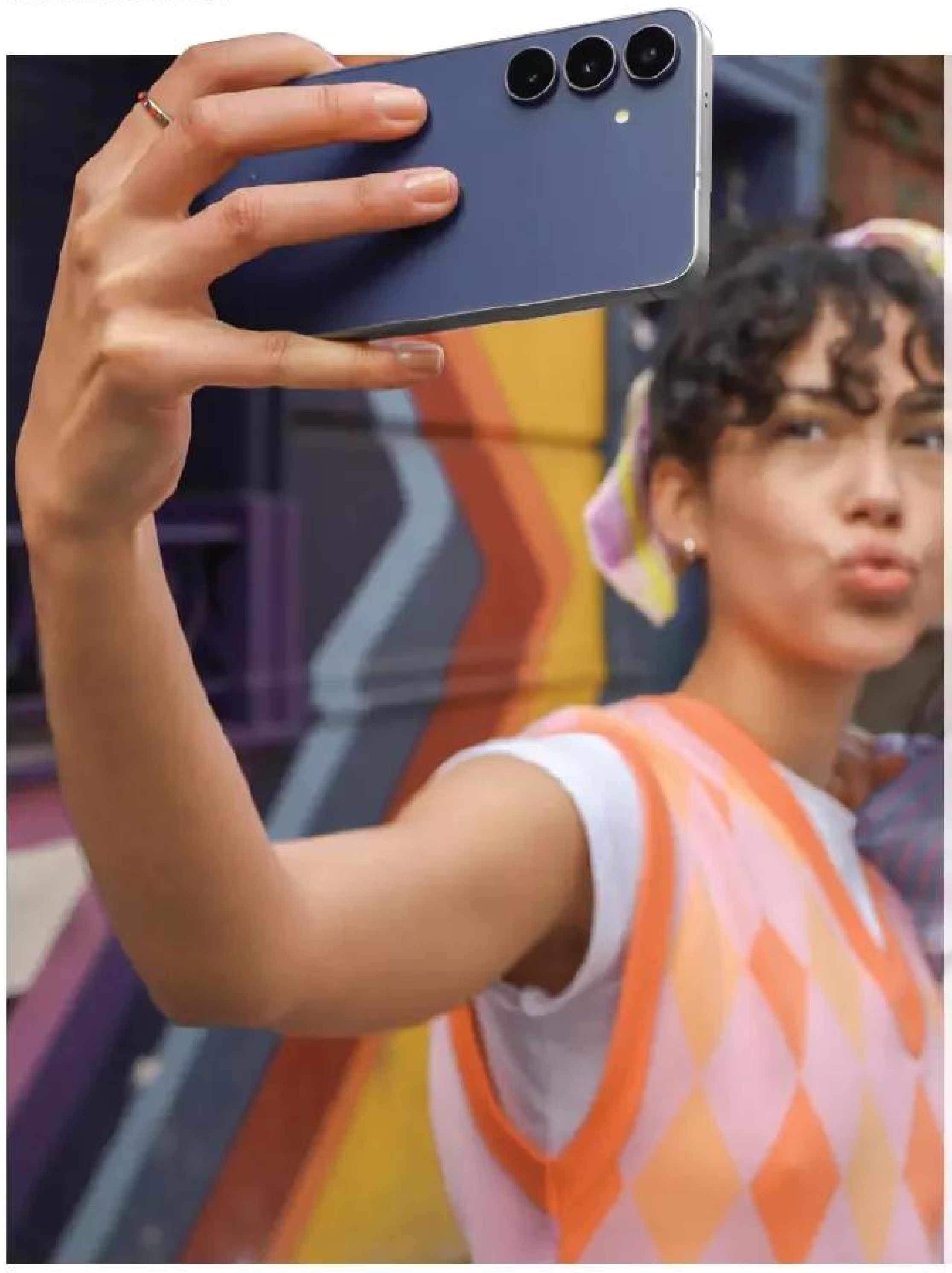
While Motorola gained many headlines for its Edge 60 Neo, also announced at IFA, I was more drawn to the ultra-affordable G06 Power. That's because it includes a whopping 7,000mAh battery, enough to get you through two days at a push. What's more, in the hand this doesn't feel like a cheap phone at all. Sure, this becomes clearer when you peer at the 6.9in panel with its 720 x 1,640 pixels, and it's no speed monster with a five-year-old MediaTek Helio G81 Ultra processor inside, but it runs Android 15 perfectly well and has its place in less demanding pockets. TIM DANTON



## SAMSUNG GALAXY TAB S11 ULTRA

PRICE **256GB, $2,099 from samsung.com** AVAILABILITY **Now**

Samsung announced the 11in Galaxy Tab S11 and 14.6in S11 Ultra at IFA, and they were the best tablets I got my hands on at the show by a distance. The secret sauce isn't about any individual thing but the sum of all its parts. Its Dynamic AMOLED 2x screen is absolutely gorgeous, particularly across the 14.6in diagonal of the S11 Ultra, and when paired with the new Dimensity 9400 Plus chipset and up to 16GB RAM it's hard to think of a task that won't become a pleasure on this 700g machine. I even enjoyed using the redesigned S Pen with its hexagonal barrel and solid cone tip. You also benefit from Samsung's Galaxy AI features and upgrades to Samsung's DeX desktop mode: attach a monitor and you can now expand your workspace rather than just mirror it. JASON ENGLAND



## SAMSUNG GALAXY S25 FE

PRICE **128GB, $849 from samsung.com**
AVAILABILITY **Now**

We all know the name of the game for the Fan Edition (FE) lineage of Samsung phones: a hint of the flagship experience at a mid-range price. For $849, you get a gorgeous 6.7in AMOLED display, a decently sized 4,900mAh battery and almost all of Samsung's AI and software smarts in One UI 8. It also looks the part, with an Armor Aluminium frame. Put simply, this is a strong mid-range revamp that brings the key things we love about the original S25 at a lower price. The sacrifice is all-out speed, with Samsung's mid-range Exynos chip inside, but you still get a full seven years of updates. JASON ENGLAND

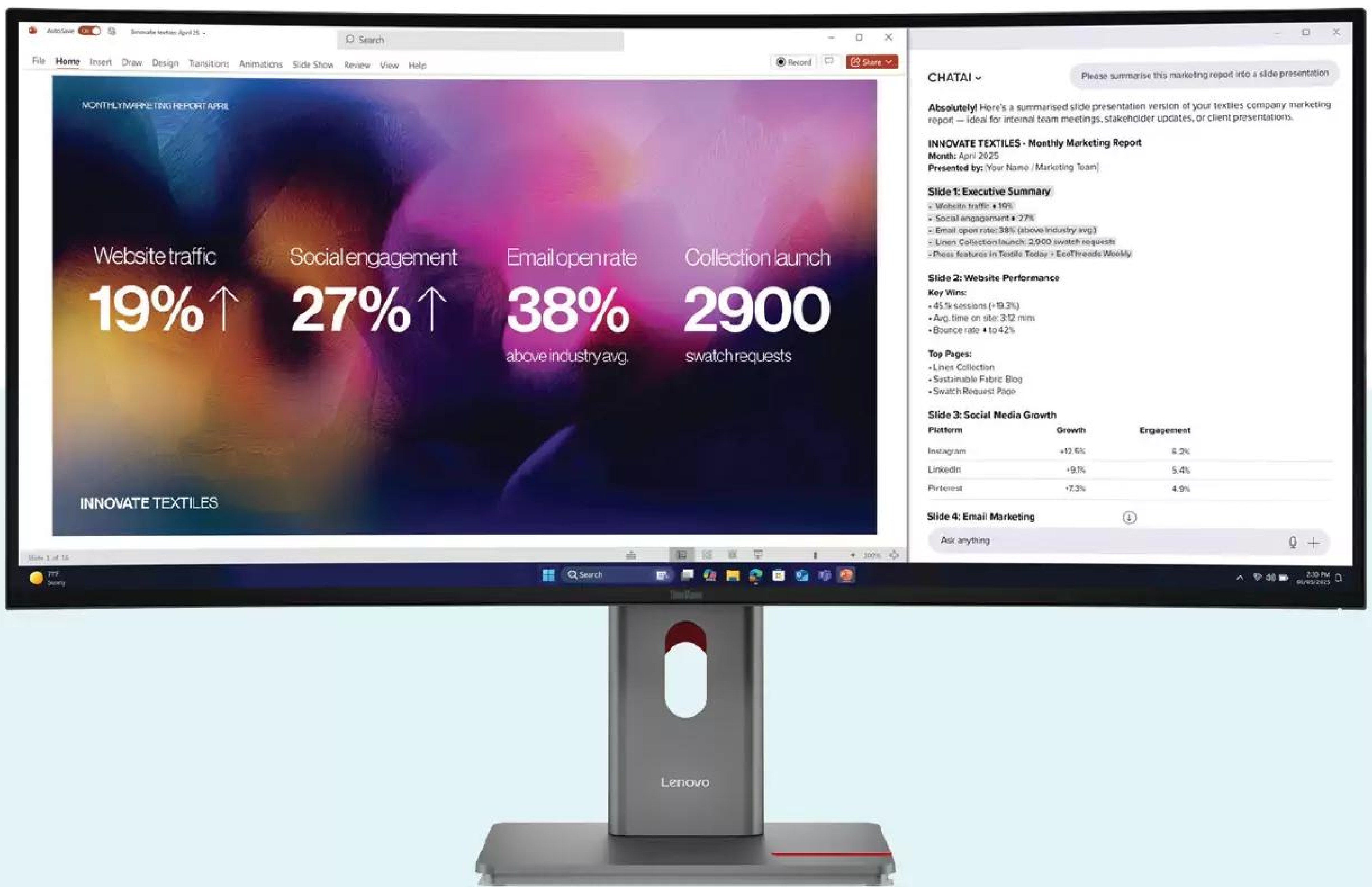
## TCL NXTPAPER 5G JUNIOR

PRICE **$TBA from tcl.com**
AVAILABILITY **TBA**

TCL describes this as a "dedicated smartphone for teenagers". As its name reveals, it uses TCL's clever Nxtpaper technology, and here the idea is that youngsters can ignore distractions using a "Digital Detox Mode" that switches to mono and kills off annoyances such as messenger apps. Google's Family Link adds safety measures such as content filtering and real-time location tracking, along with limits on screen time and app control. TIM DANTON

20
25
Tue , May 28

# MONITORS



## LENOVO THINKVISION P40WD-40

**PRICE** $1,899 from lenovo.com **AVAILABLE** November 2025

If a 32in monitor simply doesn't give you enough space, then let this 40in widescreen offering fulfil your dreams. With a phenomenally sharp 5,120 ×2,160 resolution it's very nearly equivalent to having two 27in 4K screens side by side, with a soft 2500R curvature so you don't need to slide your chair along to see detail on the edges. To help control power consumption Lenovo provides an adaptive refresh rate, from 24Hz to 120Hz, which did make a difference while I watched on, although don't imagine that will claw back running costs so far to justify the price. Instead, that comes from the IPS panel's evident image quality and superb connectivity stemming from Thunderbolt 4. This is a true docking station monitor, with all the options (including wired networking) you'd expect. TIM DANTON

amadana
amadana

## ACER AMADANA 16APM1QJ

**PRICE** $TBA from acer.com **AVAILABLE** Q1 2026

Generally I'm not a fan of portable monitors, finding them too clunky to deserve a place in my travel bag despite the benefit of having a second monitor in hotels. But the Acer Amadana 16APM1QJ may just have swayed me. It wins for both its compact dimensions and weight, both of which are reminiscent of a 13in tablet rather than a 16in device. Image quality also looks respectable – with the caveat that I haven't yet put it through our tests and the price is still to be announced. TIM DANTON

MANDY'S BEAUTY BLOG

## ACER CE270U Z

**PRICE** $TBA from acer.com
**AVAILABLE** Q1 2026

There are three things that strike you when you see the Acer CE270U Z in the flesh. The first is the raw visual power of a 26.5in OLED monitor. The second how slim the main panel is. And the third what a dull name Acer has given it. Acer CE270U Z sounds like a spare parts listing, not one of the most gorgeous products Acer has created. It's sharp in every way thanks to a 2,560 x 1,440 resolution and 280Hz refresh rate. Acer reckons that "content creators, movie buffs and gamers" will love it, and I can't help but agree. Especially with a 1,000cd/m$^2$ peak brightness in HDR mode. Add 3W speakers and it should sound the business, too . TIM DANTON

## SAMSUNG'S TRANSPARENT OLED TECHNOLOGY GOES UP A NOTCH

Why on earth has Samsung stuck a water feature into its Displays area, I thought to myself. Then I realised: this was no water feature but a transparent panel within a glass box. You may be thinking so what, but a display panel that you can see through has a wide range of uses – from window panels that can show information through to stacked internal screens or partition walls.

The technology itself is quite amazing. It's a grid of LED display cells, all so tiny as to be almost invisible. The grid of wiring has to be super thin, too. Each cell emits its own light, so there's no need for light units down the side of the panel either, so you avoid the usual reflective and opaque back panel.

Samsung has been working on this tech for a while, as has its arch-rival LG. Previous versions have been transparent up to a point, but I've always thought "translucent" was more accurate. This new generation is really very clear indeed.

The brightness of the displayed images are eye popping, and they simply hang in mid air in front of you. And this gives you a clue for a future use. Scale this down by several orders of magnitude and you might be able to create a 4K panel that's the size of a lens in a pair of glasses. This is a huge ask, because such miniaturisation would be impossible with today's technology. But give it a few years, and it might just be possible to make it optically clear enough to work as prescription lenses, and also display very high resolution and brightness images directly in your field of view.

The technical challenge of this is almost mind bending. Getting that amount of tech onto a glasses lens is one thing. Keeping the power consumption and heat dissipation is another. Then offering this as a coating layer that can be placed into a sandwich for prescription lenses is even harder.

But they might get there. And this is a step on the way. JON HONEYBALL

# GEEKY & GAMING

## PLAUD NOTE PRO

**apc BEST OF IFA 2025**

PRICE **US$179 from plaud.ai** AVAILABLE **October 2025**

You may remember the Plaud Note: this credit-card-sized device can record conversations happening around you or calls directly on your phone. It then transcribes what it hears, with 300 free minutes per month; if you need more, you'll need to stump up for the Pro subscription for $8.33 per month. At IFA, Plaud not only launched new hardware – the Note Pro includes a one-inch wide OLED screen that shows information such as battery life – but also improved software. This can create a mind map tracking the ebb and flow of your meetings, and analyse the characteristics of people within it. So if you're talking too much, or using a hectoring tone, it will tell you and make suggestions on how to improve. TIM DANTON

Lenovo
LEGION

## LENOVO LEGION GO GEN 2

PRICE **$1,809 from lenovo.com** AVAILABLE **Q4 2025**

This Windows 11-powered sequel to the Legion Go has an 8.8in OLED, detachable controllers, a more ergonomic design and AMD's Ryzen Z2 chip. The more rounded controller edges make it easier to hold than its predecessor, and I'm also a fan of the larger D-pad. It can be configured with a Ryzen Z2 or Z2 Extreme, and if leaked benchmarks are accurate it will be nearly 30% faster than its Z1 Extreme-powered predecessor. Combine that with AI features like upscaling and frame generation, and we could see some serious frame rates. TONY POLANCO

M T W T F S S
sunbooster

## SUNLED SUNBOOSTER

PRICE **TBC** AVAILABLE **TBC**

I saw a very early prototype of the Sunbooster at MWC Barcelona last year, when inventor and founder Dr Anne Berends was pitching the idea as a $10 extra to new laptops – at the time she was hoping to persuade Dell et al to back it. The idea is that near-infrared light can bring mood and health boosts similar to being out in the sun, but without harmful UV rays. Dr Berends has since changed tack to standalone units, although sadly they're not yet in the pre-production phase where I can actually put the intriguing idea to the test. TIM DANTON

## ACEMATE TENNIS ROBOT

PRICE **US$2,321 from acematetennis.com**
AVAILABLE **Pre-order**

There's only one problem with tennis: you need a partner. Ball machines are good for drills but you have to pick up hundreds of balls, and they don't allow you to rally as you would normally.

Acemate, an incubator startup from Switchbot, has the answer to all lonely tennis players' woes, and judging from what I saw (and hit against) on the showfloor, it could be a revelation. The key to its responsive nature is a pair of 4K eyes that track your movement and the ball's, with an AI engine that gives it a fighting chance of catching the ball in its net before it fires back a shot. After your session, it turns all the data into a report – your net clearance, movement and even an idea of what you should work on to improve. It doesn't come cheap on pre-order, and will be even more expensive when it goes on full sale, but I love it. TIM DANTON

## WE ARE REWIND GB-001

PRICE **$TBA from wearerewind.com**
AVAILABLE **Pre-order**

The We Are Rewind GB-001 can do everything: it's a Bluetooth speaker, a wired speaker, a cassette player, a cassette recorder, an amp and a karaoke machine. Not only is it a multi-talented superstar, it also performs exceptionally well with ground-shaking bass and clear, defined treble without being tinny or pinching. There are individual dials on the speaker for even more customisation. This is an incredibly unique product that we're excited to get our hands on to review. ERIN BASHFORD

# PERIPHERALS & NETWORKING

## REOLINK TRACKFLEX FLOODLIGHT WIFI CAMERA

ReoNeura™
Reolink AI
apc
BEST OF IFA 2025
TrackFlex Floodlight WiFi

PRICE TBC • AVAILABILITY TBC

Using AI to recognise people wandering onto your property is nothing new, but this is the first time I've seen a device where everything happens on-device, as opposed to in the cloud or on a connected NAS. I spent quite a while on Reolink's stand watching its AI tag visitors in real-time, identifying them by age group, gender, clothing and even hairstyle. You can then search locally for suspicious characters; perhaps people you've already identified on the system. Add a high-quality 360-degree 4K camera, AI tracking, auto zoom and a pair of LED floodlights that push all the way up to 3,000 lumens and you have quite the package. The only detail this device wouldn't identify is how much it will cost and exactly when it will come to market, but if your interest is piqued then you follow its progress at **tinyurl.com/APC552reolink**. TIM DANTON

## NETGEAR NIGHTHAWK M7 PRO

PRICE ~US$1,800 from netgear.com
AVAILABILITY TBC

While Australian pricing is to be confirmed, based on the US price it'll be steep. But what if your team needs access to a 5G signal and you want the solidity and range offered by Wi-Fi 7? This is the price you'll need to pay, and the Nighthawk M7 Pro can connect up to 64 concurrent devices with coverage up to 2,000 square feet. There's also a 2.5GbE port for wired connections, while USB-C is there for charging (Netgear says it lasts for up to 13 hours) or tethering. And when you're back at base, you can always use it as a day-to-day router. TIM DANTON

## LENOVO THINKPAD THUNDERBOLT 5 SMART DOCK 7500

PRICE US$550 from lenovo.com AVAILABILITY Q4 2025

This was one of three ThinkPad docks Lenovo revealed at IFA 2025. It also showed off the US$380 Thunderbolt 4 Smart Dock Gen 2 7500 and US$270 ThinkPad USB4 Smart Dock 5500, but the pricey Thunderbolt 5 option stands out due to its two DisplayPort 2.1 connectors, HDMI 2.1 port and dual downstream Thunderbolt 5 ports, meaning the dock can handle up to three 8K displays and a fourth 4K display (all at 60Hz refresh rates). And via the RJ45 2.5GbE port, the dock is compatible with Wake-On-Lan, PXE Boot and MAC Address Passthrough when connected to a ThinkPad. CALE HUNT

## PHILIPS HUE SHINES BRIGHT AT IFA

Signify, the company behind Philips Hue, launched plenty of new products at IFA, including the long-awaited Philips Hue Bridge Pro, seamless light strips, a video doorbell and heaps of smart bulbs.

The $179 Bridge Pro essentially connects your Philips Hue devices. It can support over 150 lights (compared to 50 for the Philips Hue Bridge v2) and 50 accessories, and turns your Hue lights into motion sensors without any extra hardware. This technology is called MotionAware, and will work with almost all existing Philips Hue bulbs and lights that are connected to a Bridge Pro, not just new ones.

hue Essential
hue Essential

New ones such as Philips' Hue Essential range, a collection of affordable – albeit slightly dimmer – smart lightbulbs and strips. You can control their basic functions from your phone via Bluetooth or use a Philips Hue Bridge to unlock advanced features such as scenes and automations, and trigger lights with timers, switches and sensors. Available now, Philips Hue Essential A19 bulbs and GU10 spotlight bulbs start at $47 each and Strip Lights start at $48.

In addition, Philips announced the Philips Hue OmniGlow, which will go on sale in Q4 of this year and cost $279 for a three-metre strip. Each strip is packed with tiny LEDs less than 0.5mm across, creating a seamless band of light, and can bend as needed.

Finally comes the Philips Hue Secure Video Doorbell, a 2K camera to rival Ring and its ilk. You can watch footage from your doorbell or camera live on your phone, and review videos from the last 24 hours for free. If you want to store your clips for longer than that, you'll need a paid-for Hue Secure subscription plan. The doorbell is US$169 and we're waiting to hear what the Australian price will be. CAT ELLIS

# Ditch Your PASSWORD MANAGER

Don't trust your browser to store your login data – switch to a safer and smarter password manager. **Robert Irvine** tests 20 and recommends the best three.

Some people say the safest place to store passwords is in a notebook. After all, a pen and paper can't be hacked. But in practice, writing down full login details for every website and app you use is a tedious task that's not without risk.

Many sites now insist you use long, complex passwords containing numbers and special characters, which leaves plenty of scope for error in your notebook jottings. Entering a '1' instead of an 'l' or a '0' instead of an 'O' will prevent you from accessing an online account.

It's therefore wiser to save your logins in a password manager, so you can fill in those username and password boxes automatically. The easiest option is to use the tool built into your web browser, such as Google Password Manager in Chrome.

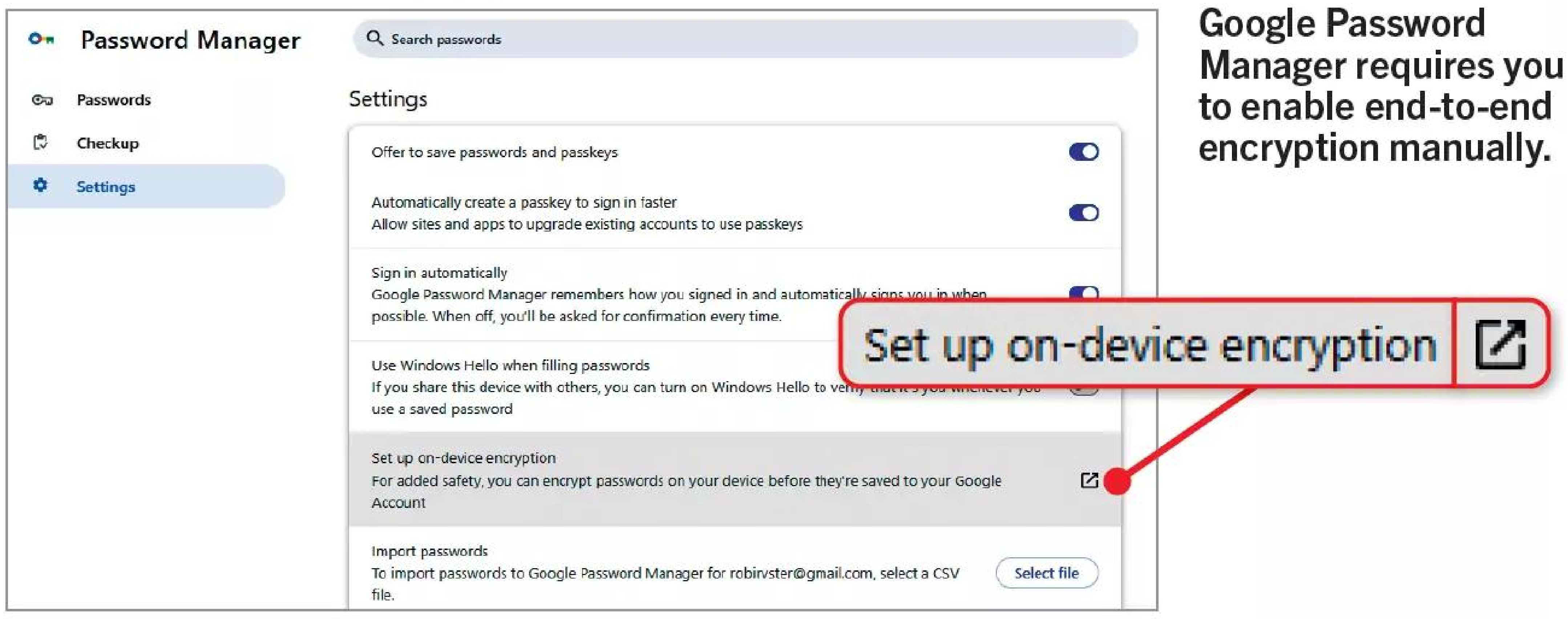
However, for reasons we explain opposite, it's much safer and smarter to use a dedicated password manager. There are dozens to choose from, including free, freemium and paid-for options, with different benefits and restrictions.

Here we've tested 20 popular password managers to find the best tools. We considered factors such as ease of use, features, versatility and value for money to decide our top three, as well as three runners-up. We also show you how to make using your chosen password manager as simple and secure as possible.

## WHAT YOU CAN DO

- Sign into your online accounts automatically
- Sync your passwords across your PC, phone and tablet
- Securely store all your personal information
- Identify weak, reused and compromised passwords
- Generate stronger passwords for your accounts
- Log into websites using passkeys and 2FA codes
- Avoid spam and scams by using email aliases
- Give trusted people emergency access to your passwords

# WHY YOU NEED A *PROPER* PASSWORD MANAGER


Password Manager

Search passwords

Passwords

Checkup

Settings

Settings

Offer to save passwords and passkeys

Automatically create a passkey to sign in faster
Allow sites and apps to upgrade existing accounts to use passkeys

Sign in automatically
Google Password Manager remembers how you signed in and automatically signs you in when possible. When off, you'll be asked for confirmation every time.

Use Windows Hello when filling passwords
If you share this device with others, you can turn on Windows Hello to verify that it's you whenever you use a saved password

Set up on-device encryption
For added safety, you can encrypt passwords on your device before they're saved to your Google Account

Import passwords
To import passwords to Google Password Manager for robirvster@gmail.com, select a CSV file.

Select file

**Google Password Manager requires you to enable end-to-end encryption manually.**

## Use zero-knowledge encryption

The built-in password managers in Chrome, Edge and other browsers offer only basic protection of your credentials. Entering the password or PIN you use to sign into your computer is usually enough to reveal your passwords. This means anyone who knows your PC login can also access all your passwords. Mobile browsers are more secure, because they protect your passwords using your device's biometric screen-lock method, such as your fingerprint or face.

Although your synced passwords are encrypted through your account with the respective services, Google Password Manager (used by Chrome and Android) and Microsoft's password manager don't provide end-to-end encryption by default (Apple and Mozilla do). To activate it, you need to set up on-device encryption through the password manager's settings (see screenshot above right).

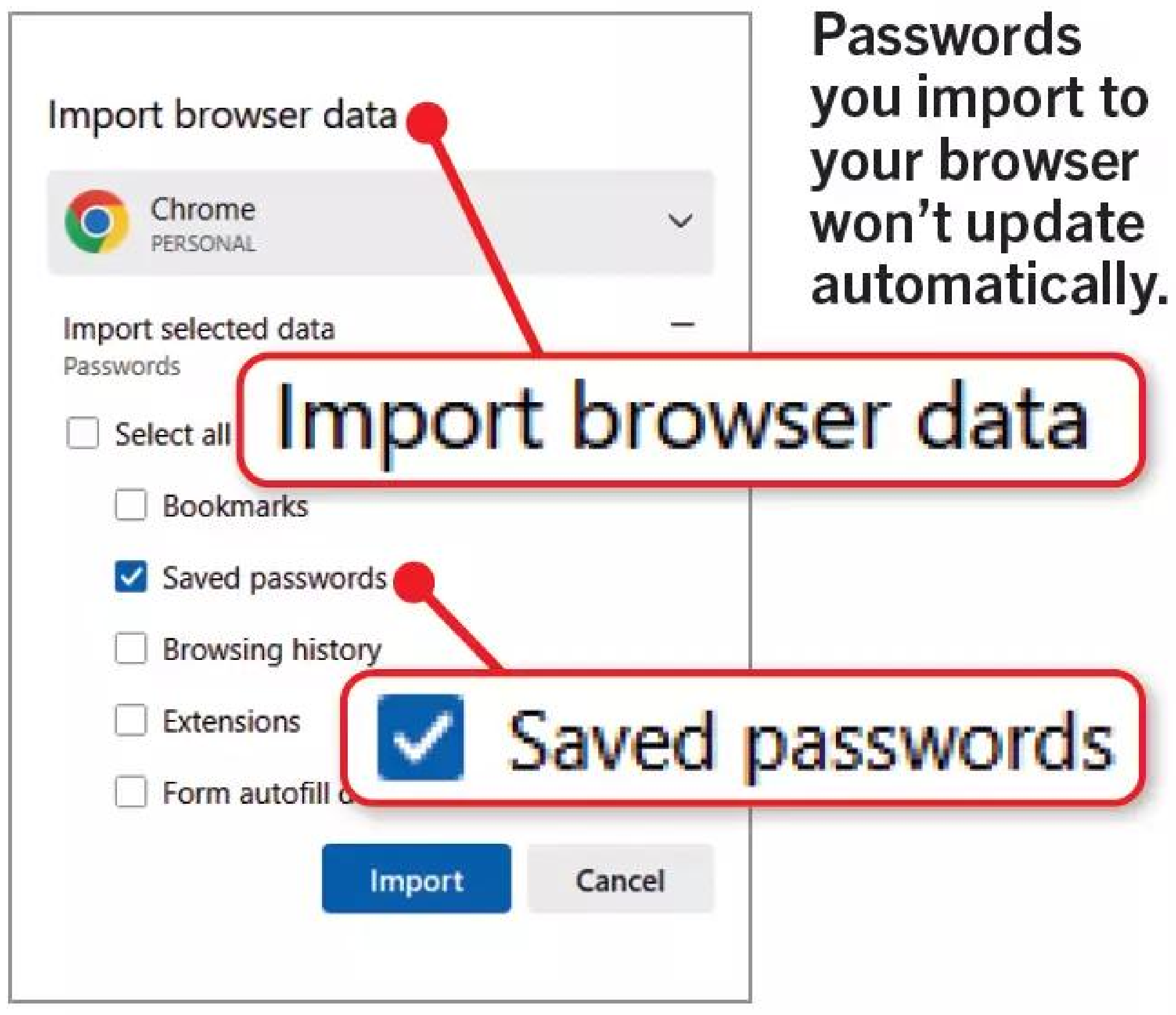
In contrast, dedicated password managers protect your logins automatically when you set up your master password. They secure your password vault using zero-knowledge encryption, which means they can't see your data, and passwords you sync online are protected using end-to-end encryption. Only you can decrypt them by entering your master password.

What's more, standalone password managers aren't at risk from the security threats that target browsers, including malicious scripts and extensions, phishing attacks and vulnerabilities in the software itself. And, unlike Chrome and Edge, they don't collect your data or track you online.

## Store all your personal data securely

The best password managers go beyond storing website and app logins, and protect your other personal data too. This includes your phone number, home address and payment-card details, and lets you auto-fill that information in online forms.

Most browsers store these details separately from your passwords, without any form of encryption (card details are partially concealed by asterisks). They also lack the option to save secure notes containing sensitive information such as your Wi-Fi password, passport and insurance-policy numbers.


Import browser data

Chrome
PERSONAL

Import selected data
Passwords

☐ Select all
☐ Bookmarks
☑ Saved passwords
☐ Browsing history
☐ Extensions
☐ Form autofill d

Import
Cancel

**Passwords you import to your browser won't update automatically.**

## Auto-fill passwords across devices

Some built-in password managers auto-fill data only in the browser, not in mobile apps. You can set most dedicated tools as the default auto-fill service on your Android or iOS device to fill in usernames and passwords on all supported apps (see page 58). In fairness, Google Password Manager and Apple Passwords (via iCloud Keychain) also do this, but they're limited in other ways.

Although you can import passwords from one browser to another (see screenshot above), you can't sync them between their password managers. This means they won't be updated in both browsers if you change them after a data breach. Cross-platform password managers automatically update your logins across all devices when you change them and save the new details.

## Choose how to access your passwords

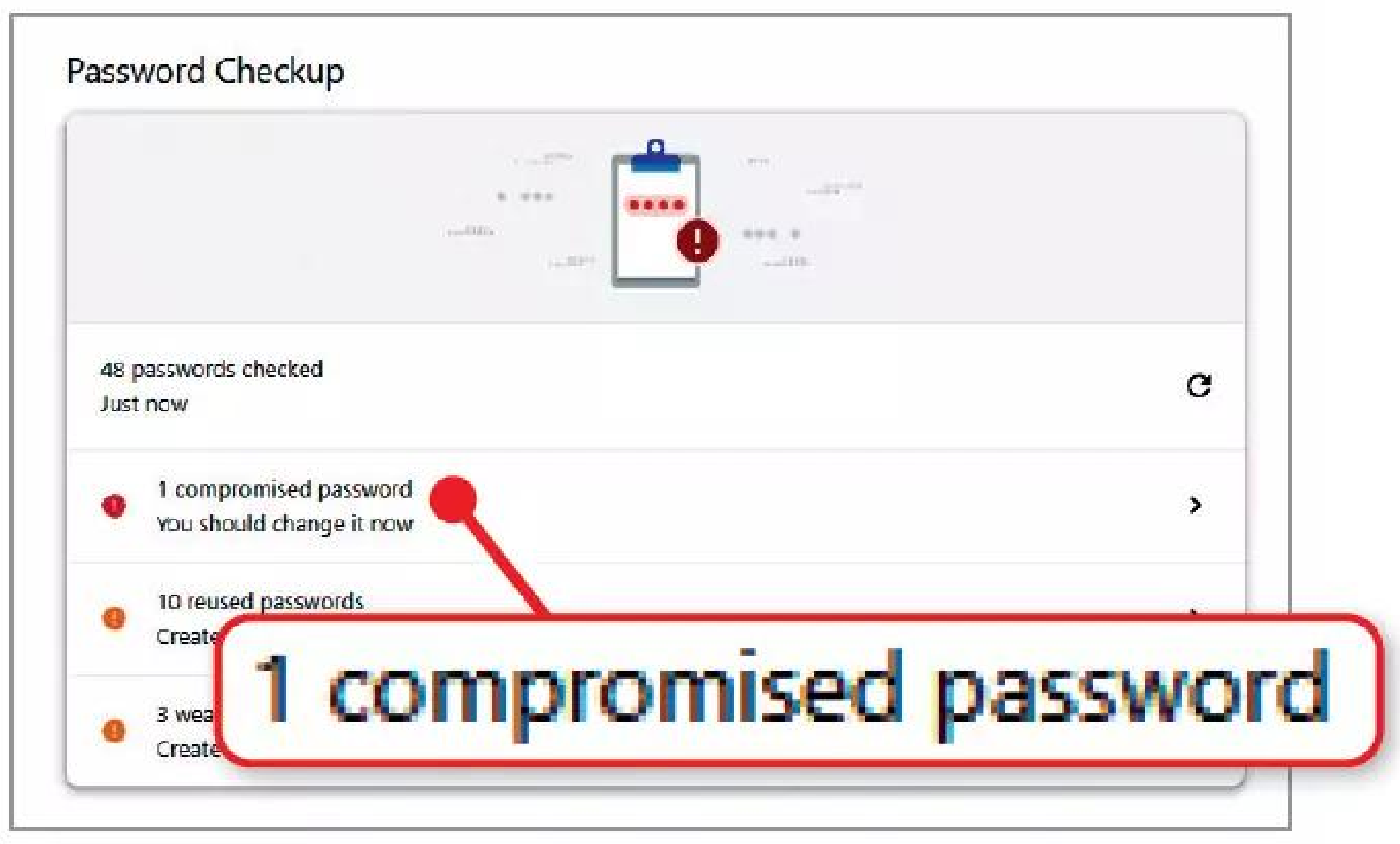
Google recently launched an Android app for its password manager (**tinyurl.com/APC552googdroid**). While this provides quicker access to passwords stored in Chrome, dedicated password managers offer greater flexibility. Most have apps for Windows, Android and iOS, extensions for Chromium and Firefox browsers, and web vaults you can sign into from any browser. This makes it easy to enter your usernames and passwords on any device, whether you use auto-fill or copy and paste the details.

## Get additional password features

Browser password managers do little more than manage passwords, but third–party tools offer many more options. These include a password generator that creates complex custom logins, rather than just 'suggesting' them as browsers do.

Most password managers let you share sensitive data securely with trusted friends and family, and scan your logins to alert you if they've been compromised in data breaches or are weak or reused. Many also store two-factor authentication (2FA) codes, so you don't need a separate authenticator app, and let you access your password vault offline.

Google Password Manager now includes a Password Checkup tool that alerts you to compromised passwords (see screenshot below), and the option to share passwords if you set up a Google family group. But it's basic compared with third-party tools, as we'll explain over the next few pages.


Password Checkup

48 passwords checked
Just now

1 compromised password
You should change it now

10 reused passwords
Create

3 wea
Create

**Google Password Manager has a basic Password Checkup tool.**

# WHICH PASSWORD MANAGER SHOULD YOU USE?

GOLD AWARD

## Bitwarden

**tinyurl.com/APC552bitwarden**

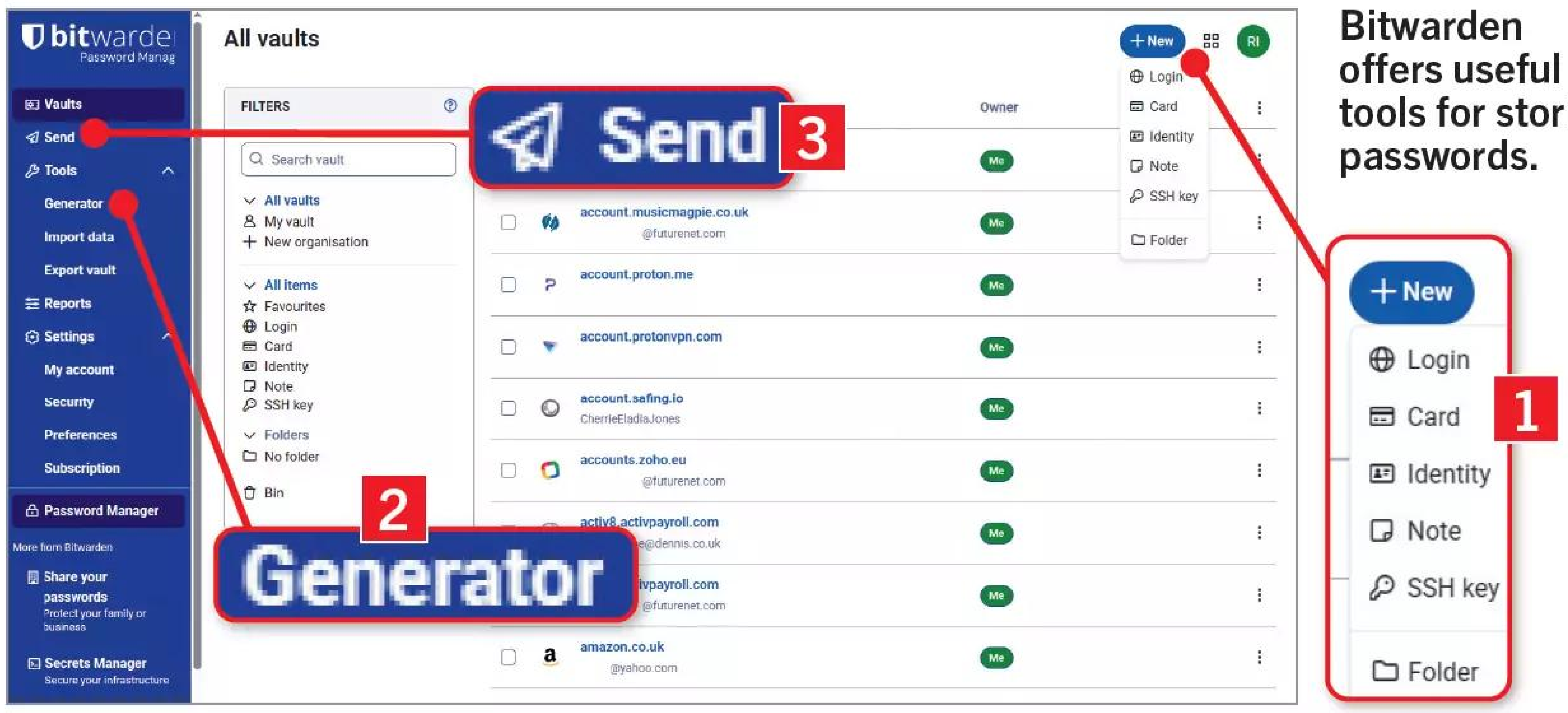
### What we like

Bitwarden offers a generous free plan and a great-value Premium subscription, priced at just US$10 per year. That makes it the perfect replacement for your browser's password manager, because you can try it for free before deciding whether to pay for its advanced options.

The free version will be enough for most users. There's no limit to how many passwords you can add and import, and you can sync them across your desktop and mobile devices using Bitwarden's free apps for Windows, macOS, Linux, Android and iOS. It also has extensions for Chromium and Firefox browsers, which you can use instead of their own, inferior password managers.

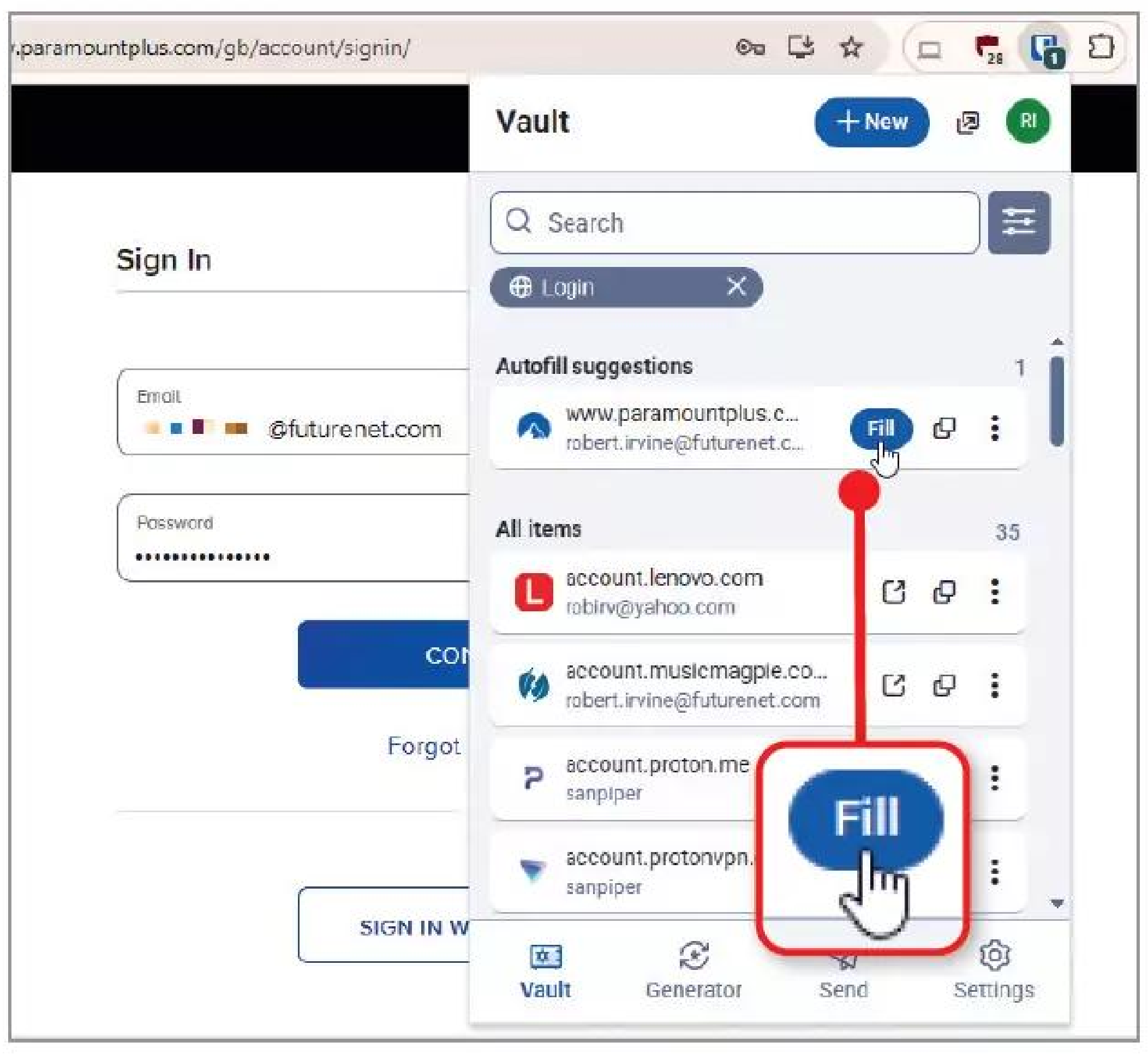
The browser add-ons let you add passkeys to your Bitwarden vault, so you can sign into websites without using a password. However, entering usernames and passwords is also straightforward – simply click a login box to auto-fill the relevant details from your vault. Alternatively, click the extension's toolbar button and choose Fill next to the site's name (see screenshot right). Bitwarden will save passwords for sites that aren't already in your vault, and create them for new sites you register with.

As well as logins, Bitwarden can store payment card details in its Card section, and personal data in its Identity section – click New (1 in our screenshot above right) to access these options. Your identity can include your full name, email and postal address, phone number and your passport, National Insurance and driving-licence numbers. You can then use auto-fill to enter this data in forms as you would passwords.



Bitwarden offers useful tools for storing passwords.

Bitwarden also lets you add secure notes containing sensitive information, but to upload files you need to upgrade to the Premium plan. This gives you 1GB of encrypted storage for file attachments, as well as several useful security features.



Bitwarden fills in usernames and passwords on websites with one click.

Most notably, you can generate time-based one-time passwords (TOTPs) for logins in your vault, allowing you to sign into websites and apps using that 2FA method. Bitwarden Premium also has an 'Emergency access' option that allows trusted contacts to access your vault when you can't do so yourself.

All Bitwarden plans include its excellent Generator 2, which creates strong passwords, memorable passphrases and unique usernames, using your preferred criteria – such as length, type of characters and number of words. There's also a Send tool 3 for sending encrypted passwords and other data to people. You can set these messages to delete after a set time.

Bitwarden has a well-organised (if slightly dated) interface across its web vault, apps and extensions, making specific information and features easy to find. We also like that you can change your master password and default email address whenever you want, and sign into Bitwarden with a passkey.

### What we don't like

Although Bitwarden can check if your email address has been exposed in a data breach, you need to pay for a Premium subscription to view compromised, reused and weak passwords. This may cost less than a dollar a month, but Google Password Manager lets you do so for free.

## Save money with a Family plan

As well as their free plans and Premium or Plus subscriptions, our award-winning password managers offer family plans. These let you share all the features of the standard paid-for tiers with up to six people.

The family password manager that makes life easier
Get Pass Family

This means you can split the cost of a subscription with your friends and family. Everyone gets their own encrypted vault, so you can't see each other's passwords, and you can securely share data, such as bank details, between you. An administrator panel lets you manage the accounts, so you can add and remove users as required.

Bitwarden's Families plan costs US$40 per year after a seven-day free trial (**tinyurl.com/APC552bitfamilies**), while Proton Pass Family (pictured) costs $8.19 per month or $58.68 a year. For NordPass Family, you need to commit to a two-year subscription, which costs $90.96.

**VERDICT** Bitwarden offers everything you need from a password manager. It's easy to use, stores unlimited logins and other data, and works seamlessly across all your devices. It also has the best-value subscription of any paid-for security tool.

★★★★★

SILVER AWARD

## Proton Pass

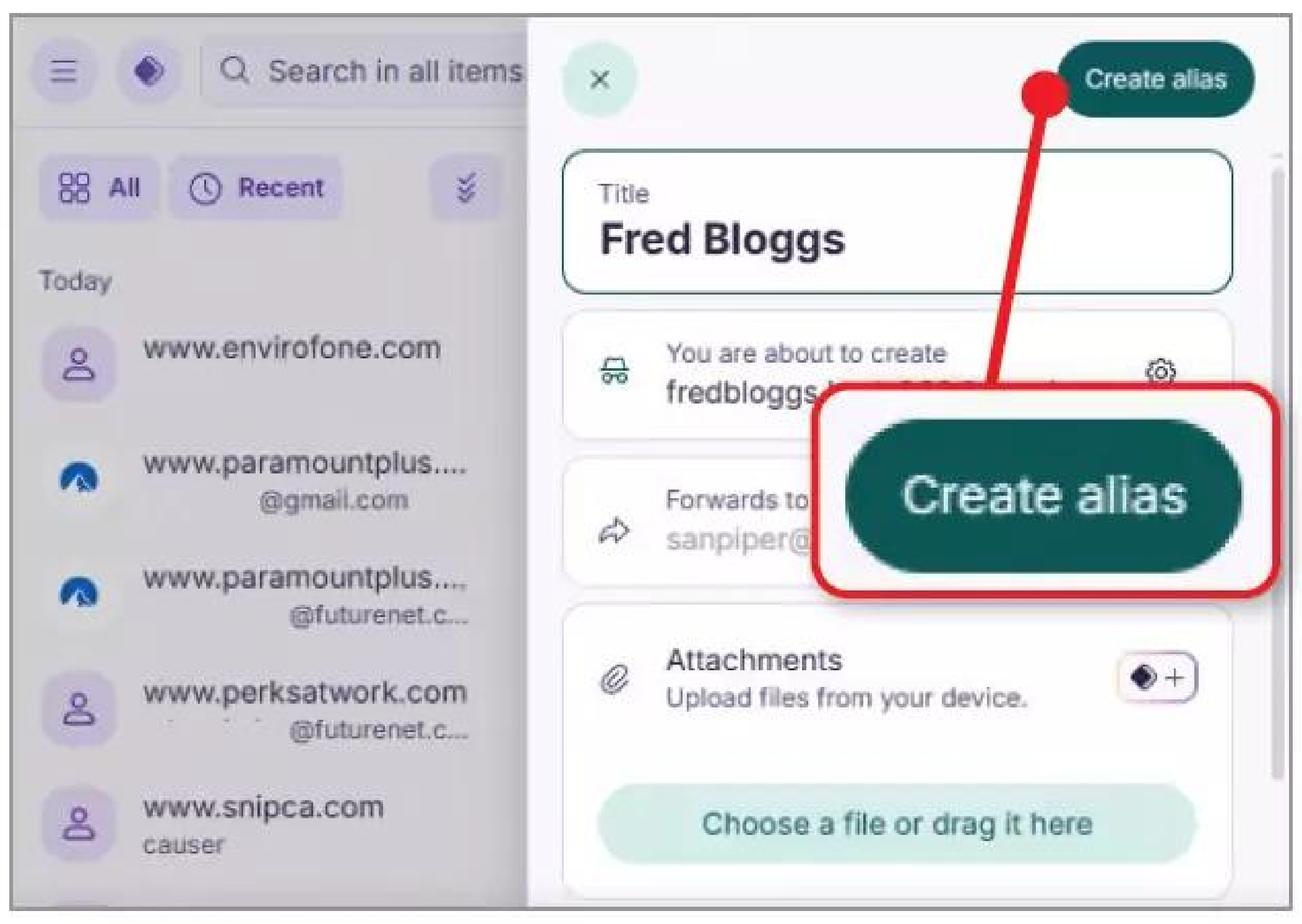
**https://proton.me/pass**

### What we like

Proton Pass narrowly misses out on our Gold Award due to the price of its Plus subscription. This costs $4.89 per month or $58.68 a year, which isn't bad value but is considerably more than Bitwarden Premium.

However, its free plan has plenty to offer, and in some ways Proton Pass is even better than Bitwarden. It has the same features, including unlimited logins, passkey support, secure password sharing, emergency access (paid-for plan only) and options for saving identities and notes, but adds the useful ability to create 'Hide-my-email' aliases.

These fake email addresses protect you from spammers, scammers and hackers by letting you sign into websites without using your real email address. Messages are forwarded to your Proton Mail inbox and you can reply to them from there. You can create aliases in your web vault, the Proton Pass app for desktop and mobile devices, and its browser extensions (see screenshot below). The free plan gives you 10 aliases, while in Proton Pass Plus they're unlimited.

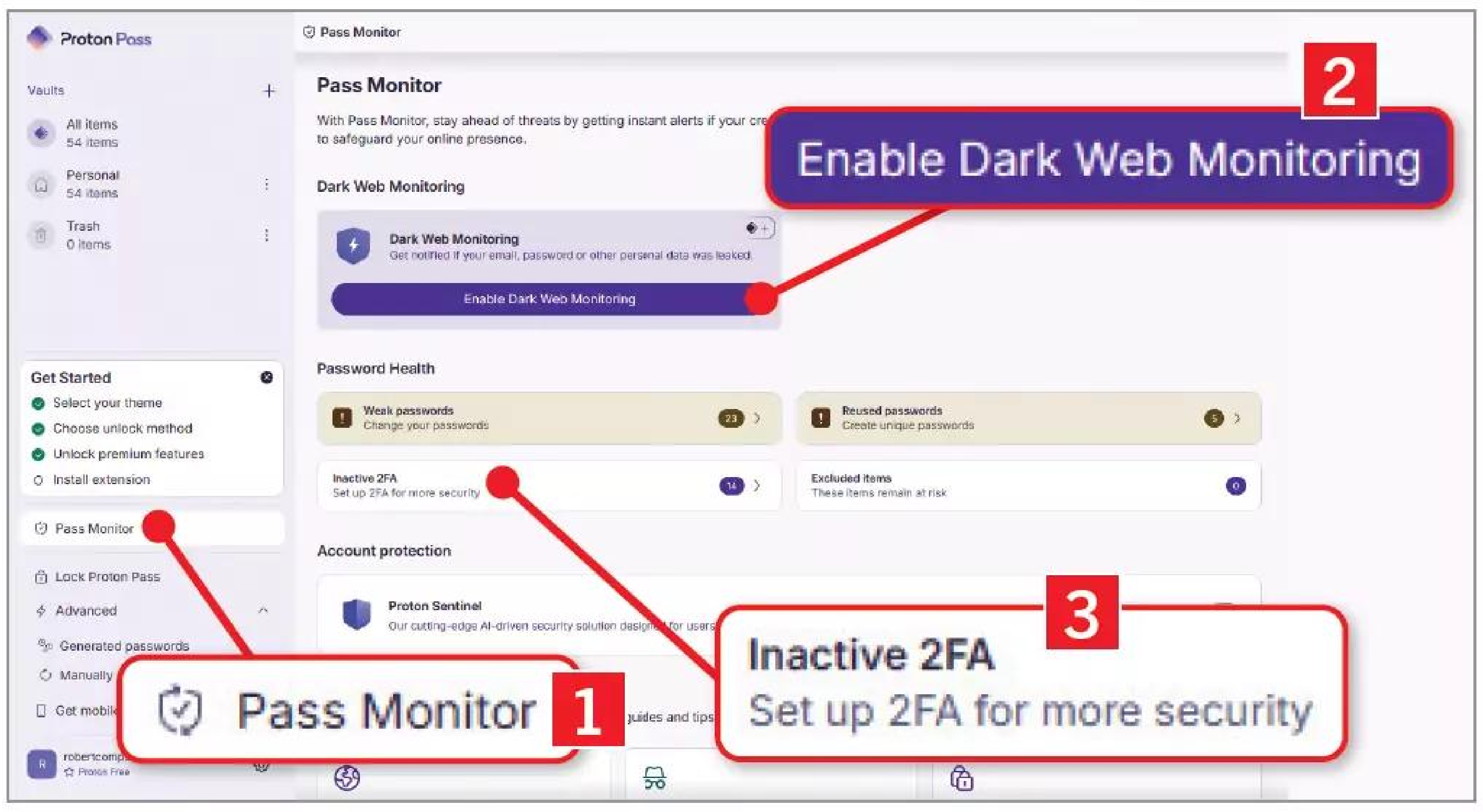


Proton Pass protects your real email address by creating aliases.

The brilliant Pass Monitor feature (1 in screenshot above right) detects weak and reused passwords in your vault. Unlike in Bitwarden, this is free, but dark web monitoring 2 requires a subscription. Pass Monitor also tells you which sites and apps have a 2FA option 3. The Plus plan generates TOTPs for your logins. The Proton Pass interface is smarter and more modern than Bitwarden's, and offers a choice of dark and light themes. It also has a password generator, but it's less sophisticated than Bitwarden's.

### What we don't like

The free version of Proton Pass doesn't let you store payment-card details, which is a strange omission. You also need a Proton account to use the password manager, and your Proton password serves as the master password. That keeps things integrated and convenient, but it means if you're locked out of your Proton account, you'll lose access to your logins.



The Pass Monitor identifies accounts with weak passwords and inactive 2FA.

**VERDICT** Proton Pass comes a close second to Bitwarden, offering lots of useful features including email aliases and 2FA checks. However, it can't match that service's value and its free plan doesn't let you store payment-card information.

★★★★★

BRONZE AWARD

## NordPass

**www.nordpass.com**

### What we like

Bitwarden and Proton Pass protect your passwords using AES-256 encryption, but NordPass uses the newer encryption algorithm XChaCha20. This encrypts data faster, doesn't require hardware support and is arguably more secure.

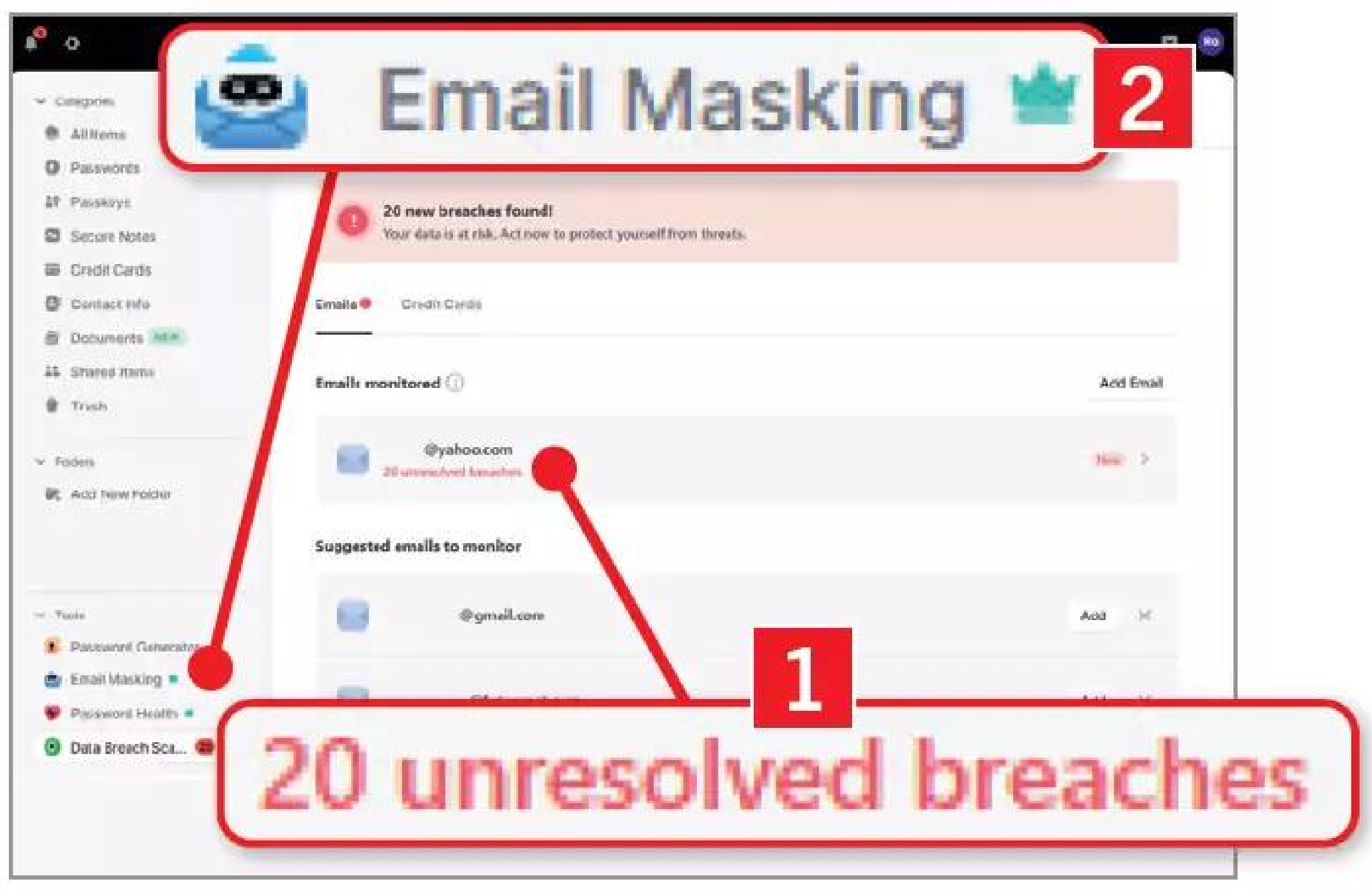
Developed by the company behind NordVPN, NordPass offers free and paid-for plans. Although the Free option offers fewer features than the Bitwarden and Proton Pass equivalents, it includes a 30-day trial of NordPass Premium, with no need to enter payment-card details.

The Premium subscription is currently discounted to $51.03 for 27 months, which works out at $1.89 a month. That's cheaper than Proton Pass, but you can't pay monthly.

Like our award winners, NordPass has apps and extensions for all your devices and browsers. However, the Free plan limits you to signing into one at a time.

With a slick, friendly interface across all its tools, NordPass couldn't be simpler to use. After you create your account and set a master password, it guides you through the process of importing your logins from other password managers or adding them manually.

NordPass can also store passkeys, personal information, credit card details and secure notes, and makes them easier to add and browse than our other award winners. The free version includes a password generator, while the Premium plan justifies its price with a data-breach scanner (1 in our screenshot below), emergency access and email masking 2 – its equivalent of aliases.



NordPass checks if your email addresses have been exposed in data breaches.

### What we don't like

NordPass Free lacks secure data sharing, password-health checks and file uploads, and – unlike Bitwarden and Proton Pass – even its paid-for plan doesn't generate TOTPs. It's also quite pushy with its nags to upgrade to Premium.

**VERDICT** NordPass is easier to use than Bitwarden and Proton Pass, and applies a newer type of encryption. But both its free and paid-for plans lack important features.

★★★★☆

# BEST OF THE OTHER PASSWORD MANAGERS

## 1Password

**tinyurl.com/APC5521pass**

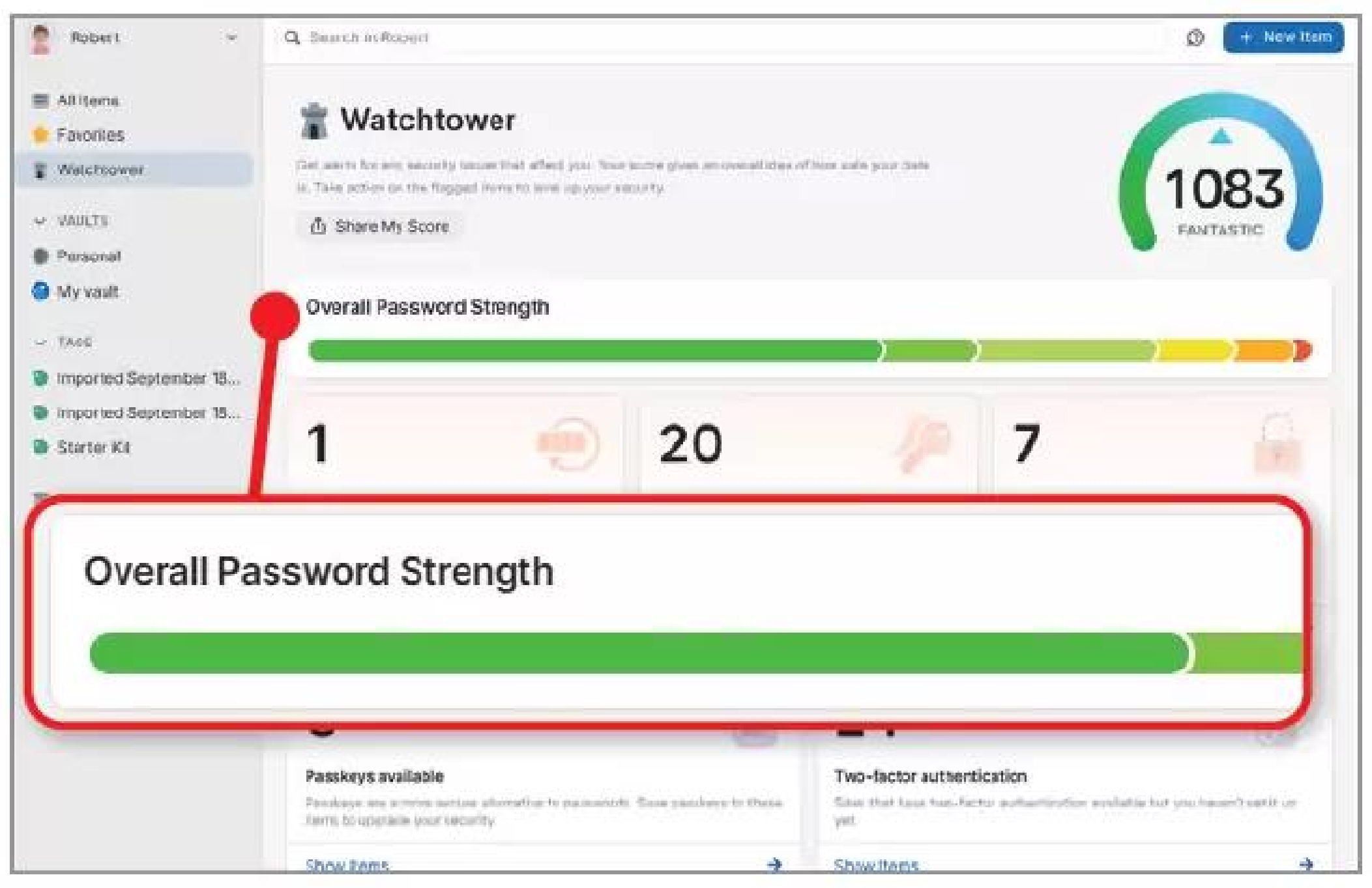
★★★★☆

1Password doesn't have a free plan, but you can try it free for 14 days – make sure you choose the option to add a payment method later. An Individual subscription costs US$2.99 per month, and includes lots of useful security tools.

Like our award winners, 1Password has apps for desktop and mobile devices, and its web app integrates with its browser extension. This lets you switch between vaults, generate passwords on the fly, save passkeys and auto-fill data with one click.

Importing passwords requires more steps than other password managers, and 1Password's interface isn't easy to use. Its best feature is Watchtower, which rates your overall password strength (see screenshot below), identifies weak and reused logins, and detects accounts for which 2FA and passkeys are available. It also notifies you when your credentials have been compromised.

We also like the Travel mode, which hides your 1Password vaults when you go abroad, other than those you mark as 'safe for travel'. This safeguards your private passwords should your phone be lost, stolen or confiscated.



**1Password's Watchtower feature rates your overall password strength.**

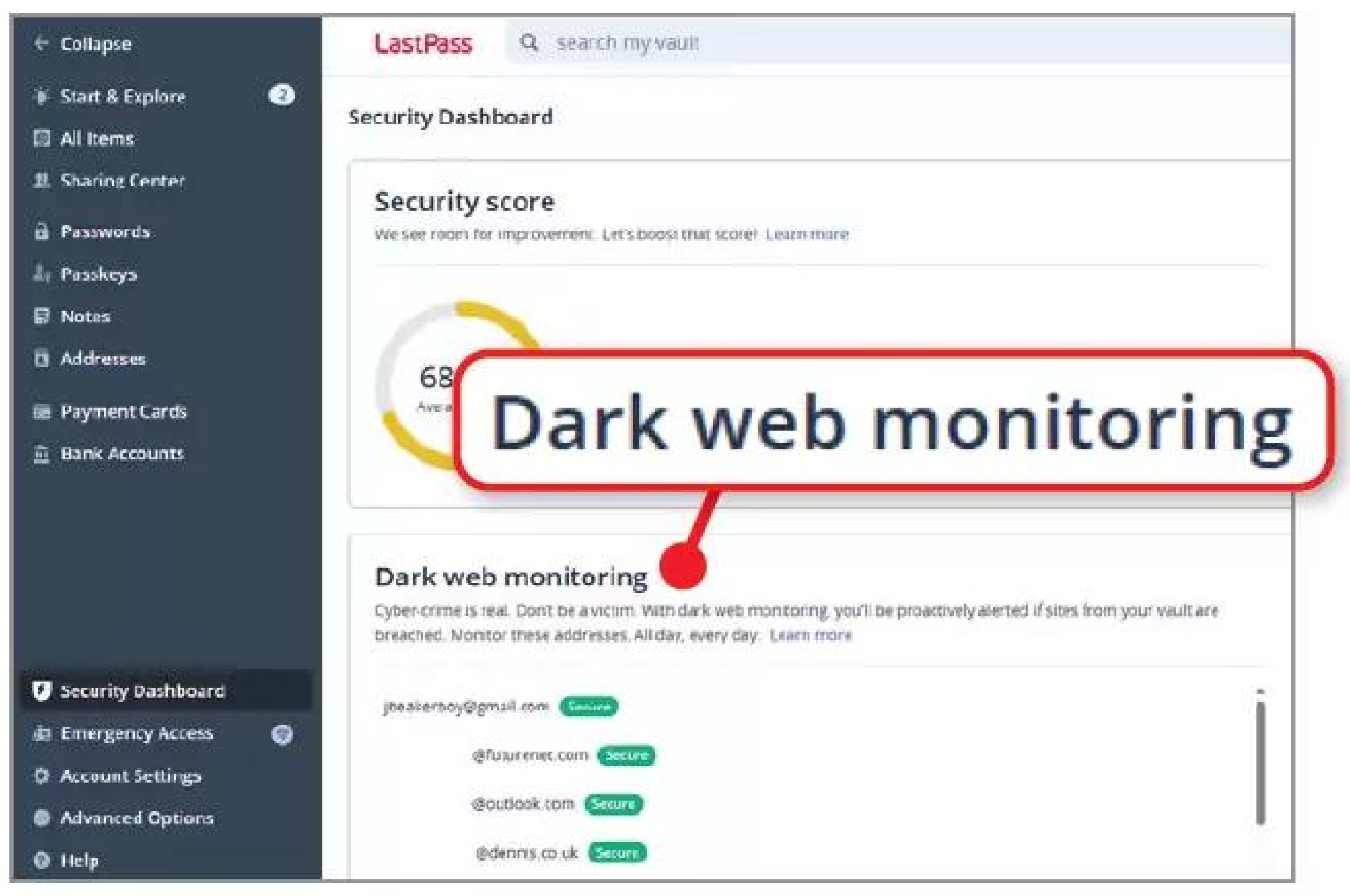
## LastPass

**www.lastpass.com**

★★★★☆

LastPass was once our favourite password manager, but it's been surpassed, and not just because of the huge security breach it suffered in 2022. It's still a good choice for features and ease of use, but only if you pay for a Premium subscription. This costs $4.50 per month after a 30-day free trial.

The free plan lets you store and auto-fill an unlimited number of logins (including passkeys), and store addresses, payment-card details and secure notes. It also offers dark-web monitoring (see screenshot above) – a feature rival tools charge for. But LastPass Free is severely hampered by only letting you use your account on desktop *or* mobile devices – not both. Unless you either never log into websites on your PC or apps on your phone, you'll find this very frustrating.



**LastPass alerts you when accounts in your vault have been breached.**

Other Premium-only options include emergency access, detection of at-risk passwords and the ability to share data with more than one person at a time. Both plans prompt you to save passwords using annoyingly large pop-ups, and inexplicably tuck away the crucial import feature in Advanced Options.

## Zoho Vault

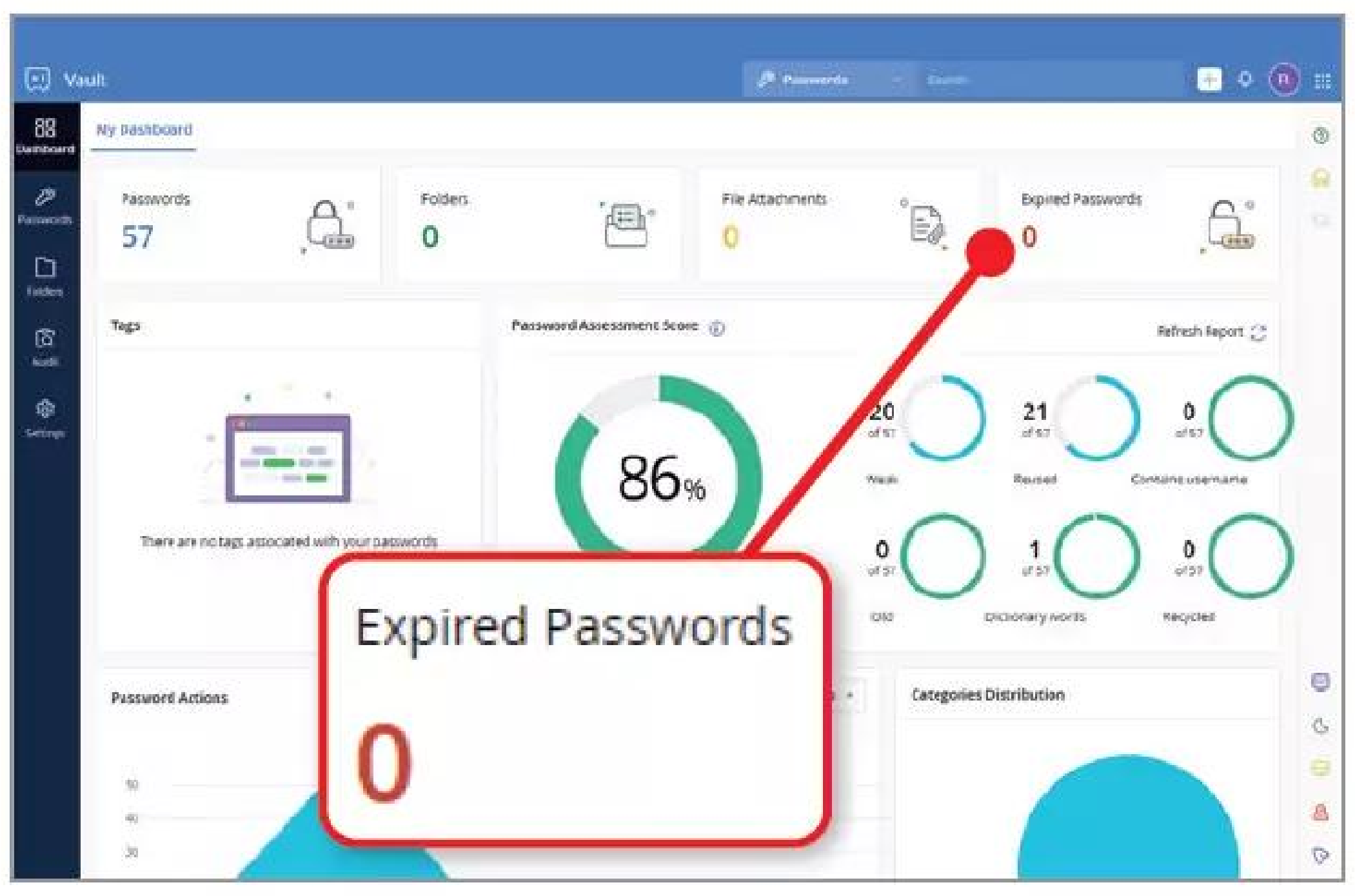
**tinyurl.com/APC552zoho**

★★★★☆

Although Zoho tools cater primarily to businesses, the Personal edition of its Vault password manager is designed for individuals, with a Free Forever plan and a bargain-price Standard subscription. This costs just $1.49 per month – almost as cheap as Bitwarden – after a 15-day free trial.

Zoho Vault's simple web interface gives an overview of your passwords through its superb Dashboard. This goes beyond highlighting weak and reused logins, to detect expired passwords (see screenshot below) and those that contain dictionary words and usernames, which makes them easier to hack. Use the built-in password generator to strengthen them.

Zoho Vault's mobile apps and browser extensions are less polished than our award winners', but – unlike LastPass – the free plan lets you sign into multiple devices. However, important features are missing, such as storage for personal data, card details and secure notes – though you can add notes, files and TOTPs to specific accounts. The Standard plan includes password sharing and cloud backup, but little else for home users.



**Zoho Vault's Dashboard highlights expired passwords in your web vault.**

## Also tested

**Norton Password Manager**
**tinyurl.com/APC552norton**
Free, with a friendly interface, but lacks advanced features

**Dashlane** **www.dashlane.com**
Recently ditched its free plan

**KeePass** **www.keepass.info**
Very secure but limits you to storing passwords on your PC

**Mega Pass** **https://mega.io/pass**
Some useful tools but the 'Free' plan is actually a free trial

**Keeper** **tinyurl.com/APC552keeper**
No free plan, and dark web monitoring costs an extra $20

**RoboForm** **www.roboform.com**
Lots of features but the free plan is restricted to one device

**AuthPass** **https://authpass.app**
No browser extension so you can't auto-fill your passwords

**LogMeOnce** www.logmeonce.com
Cluttered, confusing interface with ads

**Enpass** **www.enpass.io**
Paid-for only and no emergency access or online storage

**Bitdefender SecurePass**
**tinyurl.com/APC552bit**
Requires a subscription and lacks support for passkeys

**Google Password Manager**
Only available for Chrome and Android

**Apple Passwords**
Only available on Apple devices and via iCloud

**Firefox Passwords**
Only available in Mozilla's Firefox browser

**Microsoft Autofill**
Limited to Microsoft Edge and Authenticator

# EXPERT TIPS FOR PASSWORD MANAGERS

## Make your password manager the default tool

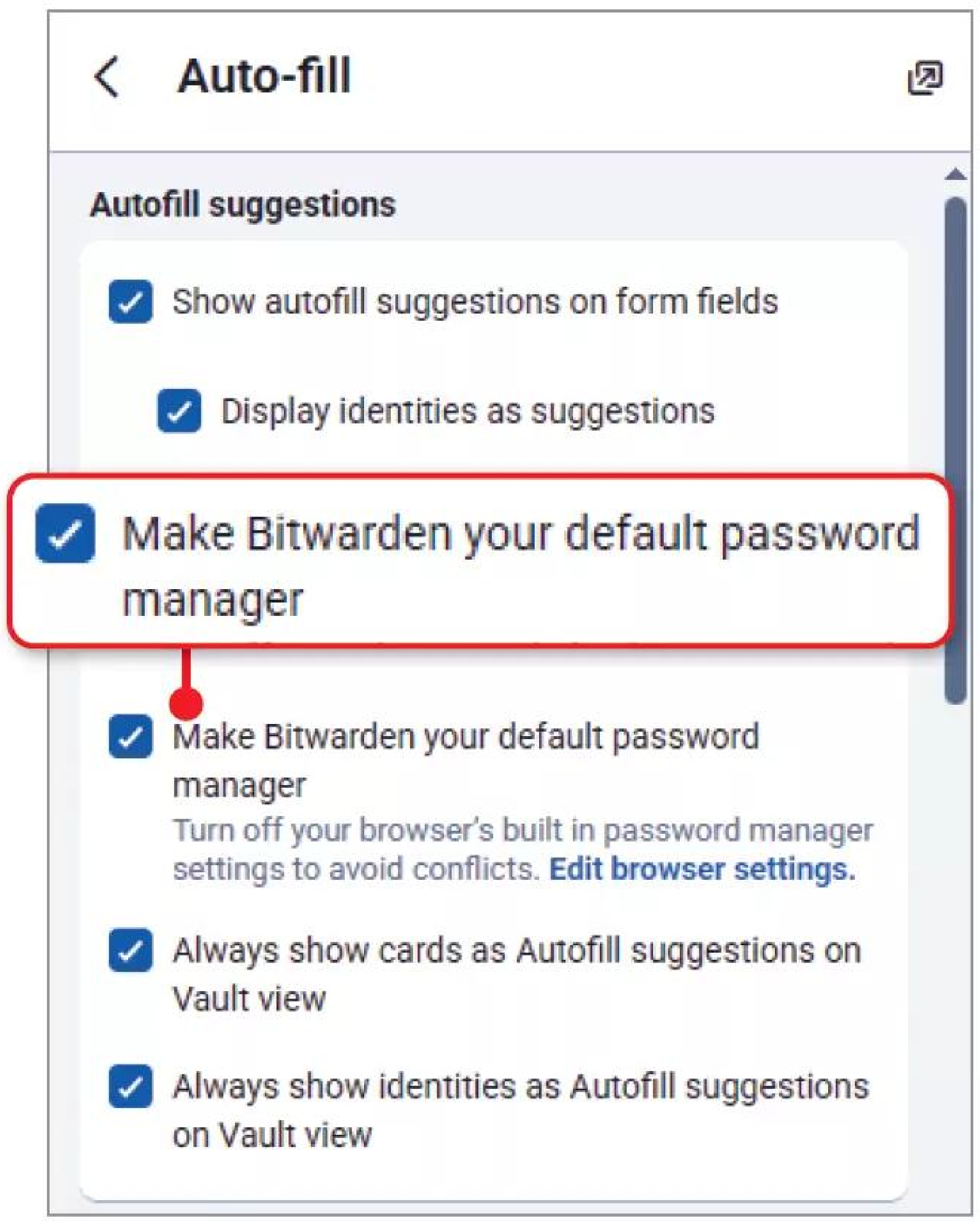
It's essential that you set your new password manager as your default service to stop your browser's built-in tool saving and auto-filling logins. You should do the same on your mobile device, or you won't be able to auto-fill passwords in apps.

To make Bitwarden your browser's default password manager, click the extension's toolbar button then Settings. Tick the box 'Make Bitwarden your default password manager' and click Allow.

With Proton Pass, click the three-line menu button in the extension panel and choose Settings. Scroll down to the bottom of the General tab and select 'Use Proton Pass as your browser's default password manager'. NordPass doesn't offer this, but disabling your browser's password manager will make it the default service. In Chrome, for example, go to chrome://password-manager/settings and switch off the options 'Offer to save passwords' and 'Sign in automatically'.

To set the default password manager on your Android device, open the Settings app and choose 'Passwords, passkeys & accounts'. Tap the 'Change' button under Google, select your password-manager app and press Change. If you don't see that option, tap Autofill in Settings, switch on 'Autofill services' and choose your password manager there.

On an iPhone or iPad, open Settings and tap General then 'AutoFill & Passwords'. Switch on the option 'AutoFill Passwords and Passkeys' and select your password manager under 'AutoFill From'.



Auto-fill

Autofill suggestions

☑ Show autofill suggestions on form fields

☑ Display identities as suggestions

☑ Make Bitwarden your default password manager

☑ Make Bitwarden your default password manager
Turn off your browser's built in password manager settings to avoid conflicts. Edit browser settings.

☑ Always show cards as Autofill suggestions on Vault view

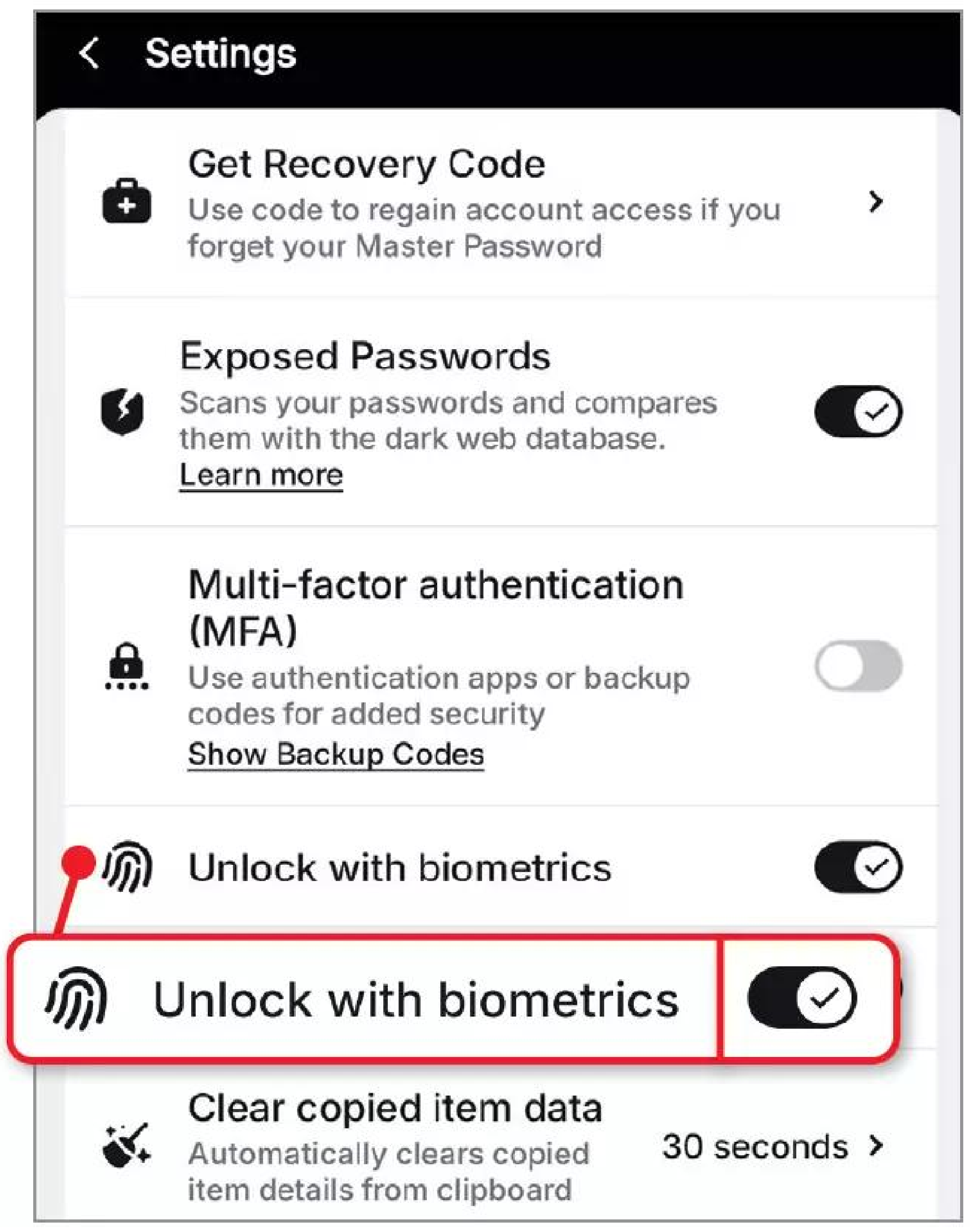
☑ Always show identities as Autofill suggestions on Vault view

**Set your new password manager as your browser's default.**

## Unlock your vault without entering a password

Rather than type your master password every time you want to unlock your vault, sign in using a biometric method such as your fingerprint or face. All our award-winning password managers offer this security option in their mobile apps, using your phone or tablet's existing biometric lock.

To enable the feature in the Bitwarden app, tap Settings then 'Account security' and switch on 'Unlock with Biometrics'. In Proton Pass, tap your profile icon, press 'Lock with' and select Biometric. To do the same in NordPass, tap your profile icon then Settings and enable 'Unlock with biometrics' (see screenshot above).



Settings

Get Recovery Code
Use code to regain account access if you forget your Master Password

Exposed Passwords
Scans your passwords and compares them with the dark web database.
Learn more

Multi-factor authentication (MFA)
Use authentication apps or backup codes for added security
Show Backup Codes

Unlock with biometrics

Unlock with biometrics

Clear copied item data
Automatically clears copied item details from clipboard
30 seconds

**Unlock your password vault using a biometric method.**

You may be able to unlock your password manager's desktop app without entering your master password, using Windows Hello. Look for this option in the Security section of Settings - Windows Hello must already be set up to use your face, fingerprint or PIN. Note that Proton Pass limits this option to its Plus plan. In NordPass it's "temporarily unsupported", but you can use Windows Hello to sign into its browser extension.

Bitwarden lets you unlock your web vault using a passkey. Select 'Settings' then Security and click 'Turn on' under 'Log in with passkey'. Enter the verification code to create and save the passkey. When you next sign in, click 'Log in with passkey'.

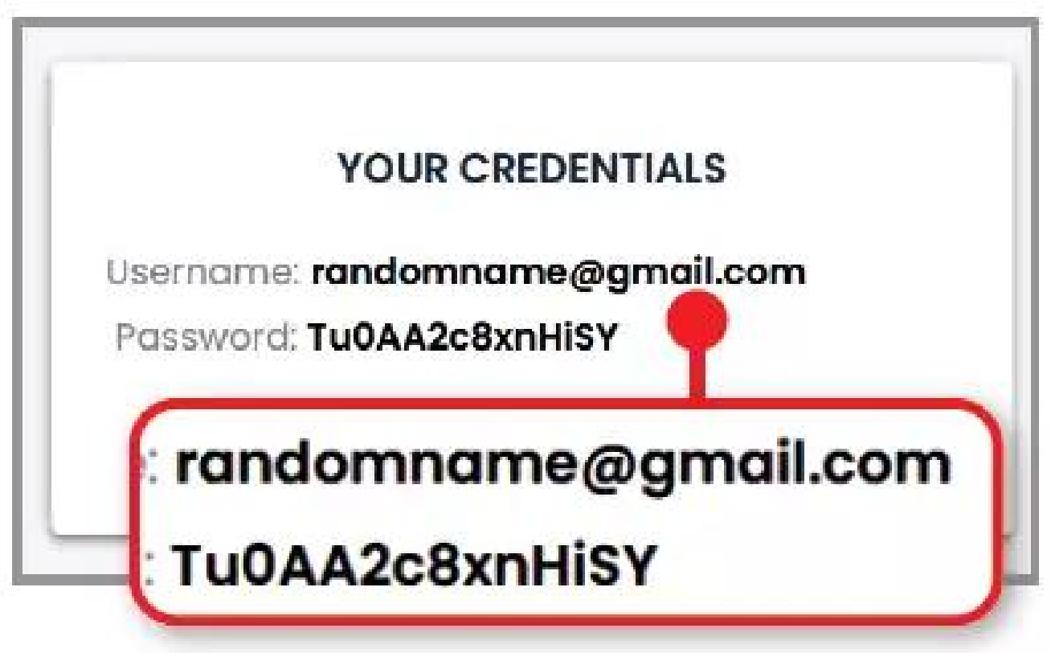
## Allow emergency access to your passwords

Many password managers now include emergency access in their paid-for plans (Proton Pass added the feature in August) and it's definitely worth enabling. It lets people you trust access your passwords and other data if you suffer an accident, illness or other unexpected event.

When you designate your trusted contacts, you can specify a wait time after which access to your vault is automatically granted. You can manually approve or decline requests to view your passwords before that time is up. Your emergency contacts must have accounts with the same password manager, and can assign you as *their* contacts.

To set up emergency access in

## Could your passwords be clickjacked?



YOUR CREDENTIALS

Username: randomname@gmail.com
Password: Tu0AA2c8xnHiSY

randomname@gmail.com
Tu0AA2c8xnHiSY

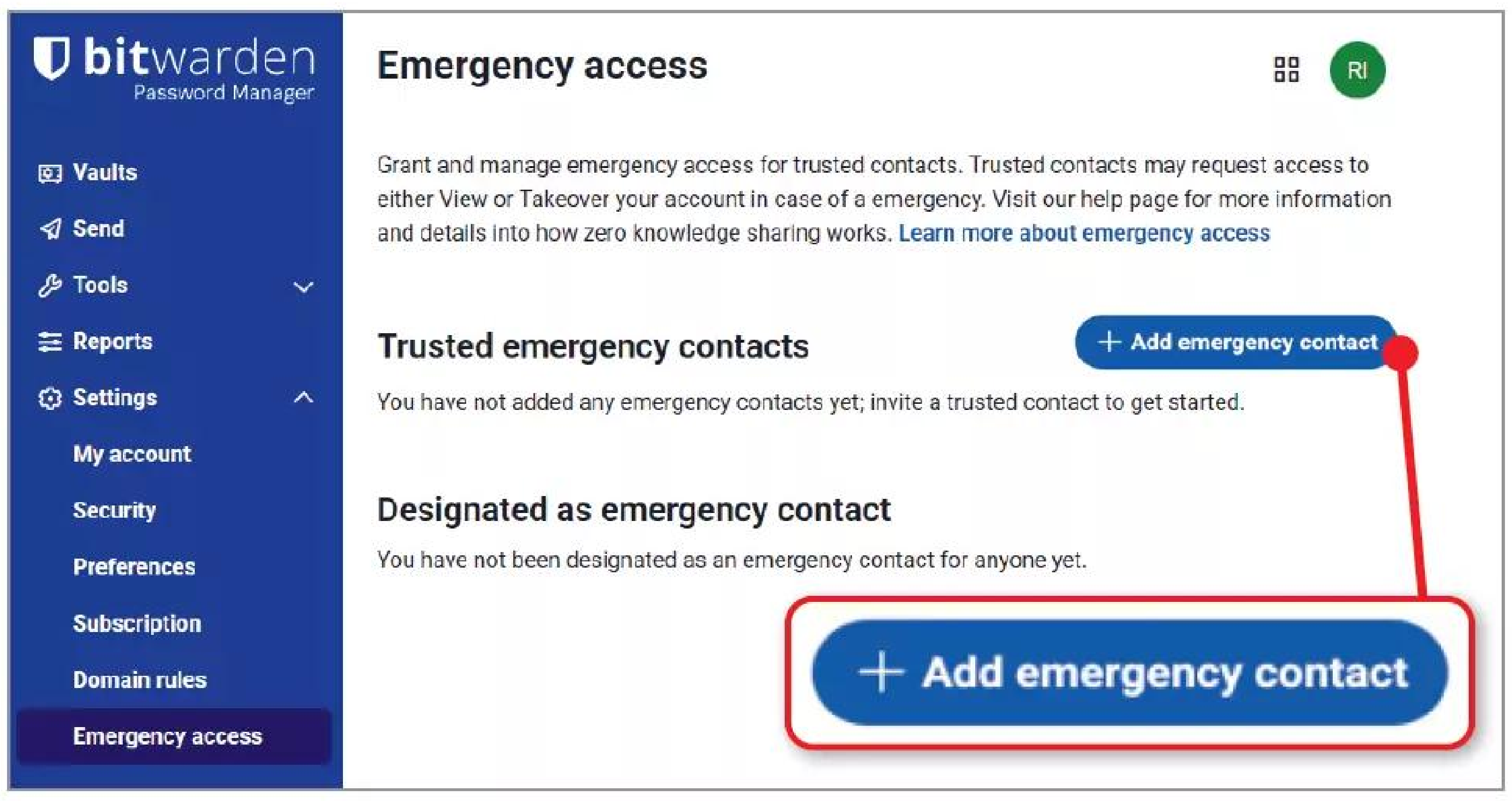
There was a serious flaw in password managers that made them vulnerable to clickjacking. This is where hackers hide invisible buttons and forms on web pages, which trick password-manager extensions into auto-filling your details.

Password-manager developers have now patched the vulnerability, but you can check using a test from security researcher Marek Tóth (who discovered the flaw). Add an entry to your password vault for the site **https://websecurity.dev**, using a random username and password.

Now visit **tinyurl.com/APC552click** and wait for the 'We use cookies' box to appear. Click anywhere on the page to see if it triggers a (safe) clickjacking script.

If nothing happens, your password manager is protected. If it isn't, the login credentials you set for the site will appear in plain text (see screenshot), and you should consider switching to a safer tool.

See this thread on Bitwarden's forum for more details about this issue: **tinyurl.com/APC552jacking**.


bitwarden
Password Manager
Vaults
Send
Tools
Reports
Settings
My account
Security
Preferences
Subscription
Domain rules
Emergency access
RI
+ Add emergency contact
+ Add emergency contact

Emergency access

Grant and manage emergency access for trusted contacts. Trusted contacts may request access to either View or Takeover your account in case of a emergency. Visit our help page for more information and details into how zero knowledge sharing works. Learn more about emergency access

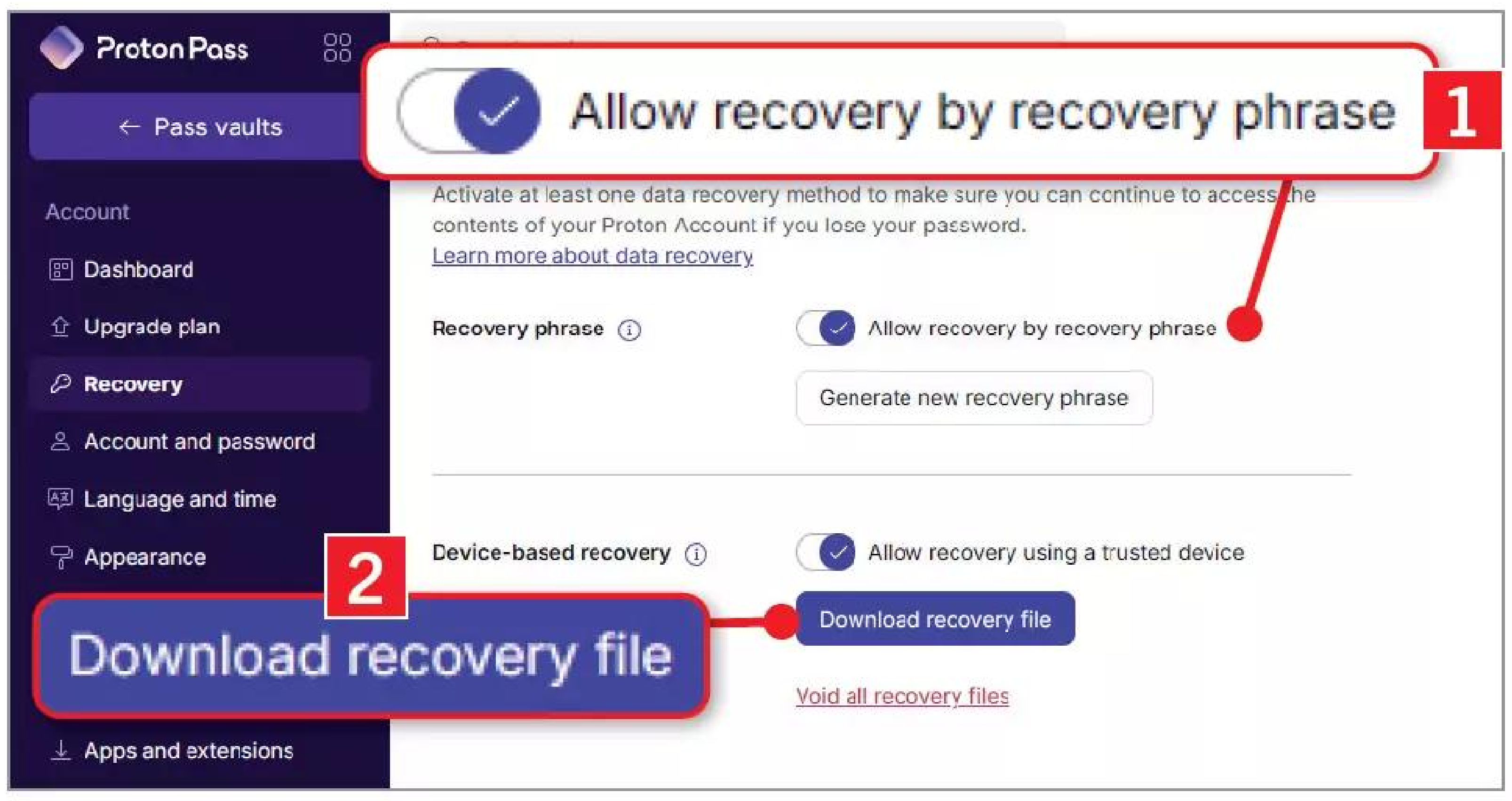
Trusted emergency contacts

You have not added any emergency contacts yet; invite a trusted contact to get started.

Designated as emergency contact

You have not been designated as an emergency contact for anyone yet.

**Your password manager's 'Emergency access' feature grants trusted people permission to view your passwords.**


Proton Pass
← Pass vaults
Account
Dashboard
Upgrade plan
Recovery
Account and password
Language and time
Appearance
Apps and extensions
Allow recovery by recovery phrase
1
2
Download recovery file
Generate new recovery phrase
Download recovery file
Void all recovery files

Activate at least one data recovery method to make sure you can continue to access the contents of your Proton Account if you lose your password.
Learn more about data recovery

Recovery phrase ☑ Allow recovery by recovery phrase

Device-based recovery ☑ Allow recovery using a trusted device

**Set up an account-recovery method in case you forget your master password.**

Bitwarden, click Settings in the left-hand menu of your web vault and select 'Emergency access'. Click 'Add emergency contact' (see screenshot above), enter the trusted person's email address and choose whether to let them see your passwords or take over your account if an emergency occurs. Click 'Save' to invite them to be your emergency contact – they must accept within five days.

Proton Pass lets you assign up to five emergency contacts (Bitwarden has no limit). Click the 'More options' cog in the bottom-left corner of your web vault and choose Account. Select 'Recovery', scroll down to the 'Emergency access' section and click 'Add emergency contact'.

In NordPass, click the Settings cog top-left, scroll down to the Other section and select 'Emergency access'. Click 'Give Access' to designate your emergency contacts – there's no limit on the number.

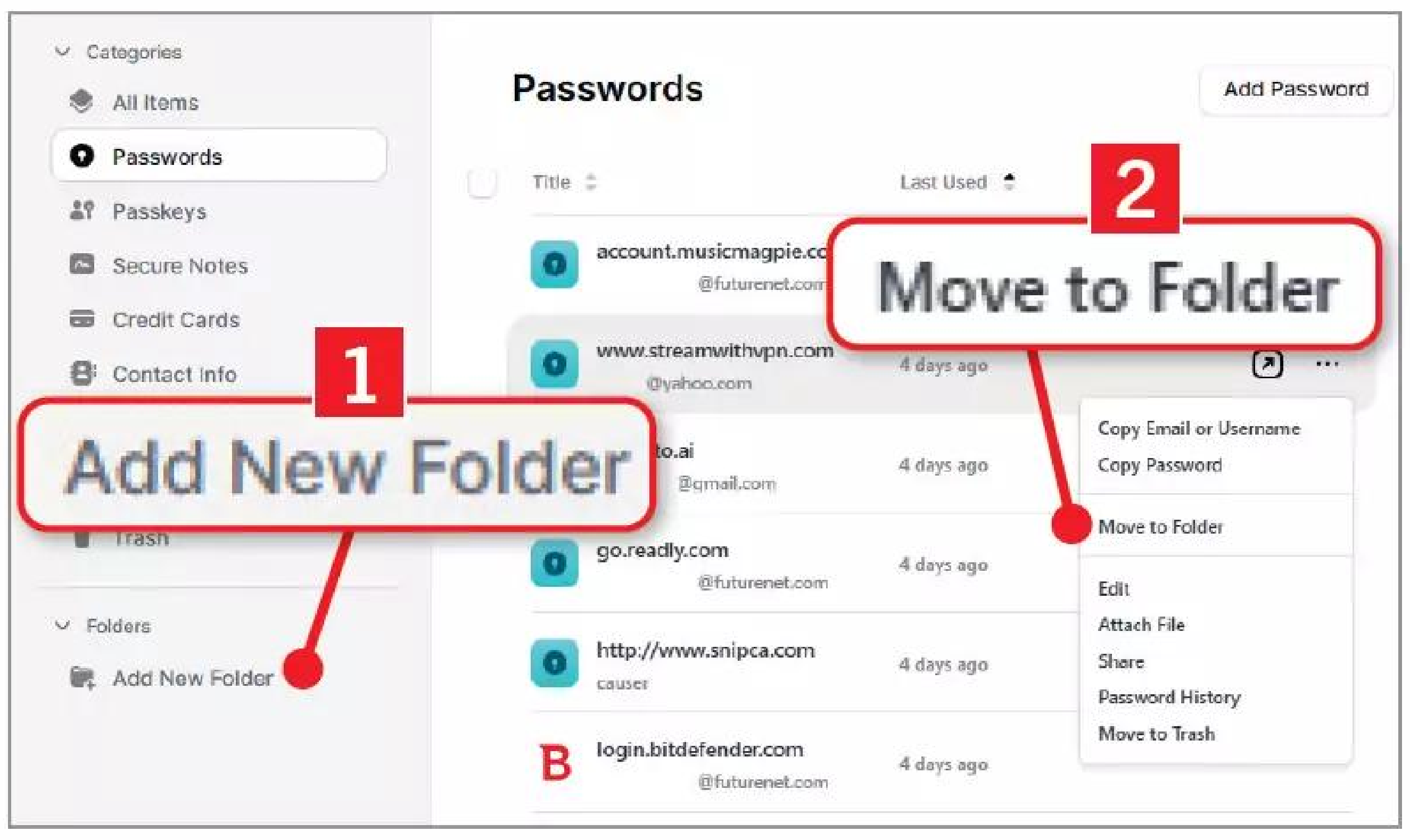
## Set up an account-recovery method

As your password manager uses zero-knowledge encryption, it can't see your master password or reset it. That makes it imperative that you set up a recovery method for your vault, so you can regain access to your passwords should you forget the master password. One option is to set yourself as an emergency contact, but there are faster ways that don't involve a waiting time.

Bitwarden insists you provide a hint for your master password when you create your account. If you get locked out, click 'Get master password hint' or enter your email address at **https://vault.bitwarden.com/#/hint** to receive a message containing your hint. It also provides a printable 'security readiness kit' (**tinyurl.com/APC552ready**) you can fill in with all your login information.

Proton Pass provides account- and data-recovery settings on its Recovery page (see previous tip). These include options to recover your account via your email address or phone number, and to recover your passwords using a phrase (1 in our screenshot top-right above), trusted device or downloadable recovery file 2.

To safeguard your NordPass vault, select Get Recovery Code in the Security section of your account settings. Either copy the code to your clipboard to paste into a text file or download it as a PDF. If you get locked out, click 'Forgot your Master Password' and enter the code.


Categories
All Items
Passwords
Passkeys
Secure Notes
Credit Cards
Contact Info
Trash
Folders
Add New Folder
1
Add New Folder
Passwords
Add Password
Title
Last Used
2
Move to Folder
account.musicmagpie.co
@futurenet.com
www.streamwithvpn.com
@yahoo.com
4 days ago
to.ai
@gmail.com
4 days ago
go.readly.com
@futurenet.com
4 days ago
http://www.snipca.com
causer
4 days ago
login.bitdefender.com
@futurenet.com
4 days ago
Copy Email or Username
Copy Password
Move to Folder
Edit
Attach File
Share
Password History
Move to Trash

**Keep your most important passwords organised into folders.**

## Organise your passwords into folders

Importing passwords from your browser is likely to produce a long list of logins in your vault – including for sites you rarely visit. To make things tidier, you can organise your most important passwords into themed folders, such as Email, Shopping and Finance.

In your Bitwarden web vault, click the New button in the top-right corner, enter a name for the folder and click Save. To add passwords to the folder, tick their boxes in your vault then click the three-dot icon top-right and choose 'Add to folder'.

Proton Pass doesn't use folders but instead lets you create additional, themed vaults. Click the plus-sign button above the Vaults list on the left, choose a name, colour and icon for the vault, then click 'Create vault'.

In NordPass, simply click Add New Folder in the left-hand menu (1 in our screenshot above), type a folder name and click Save. Add passwords to the folder by clicking their three-dot icons and choosing 'Move to Folder' 2. ■

The home of technology

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# Stop wasting your USB DRIVE!

You can use your USB flash drive to do so much more than move files between PCs. **Robert Irvine** explains 14 superb new ways to get the most from its storage and transfer speeds.

USB flash drives have shrunk in physical size as they've grown in capacity. That's probably why nobody calls them 'thumb drives' any more –'half-your-little-finger drives' would be more accurate. However, it's not just the tiny size of USB drives that makes them easy to overlook. Many of us buy them to transfer files from one computer to another, then leave these versatile portable devices languishing in a drawer.

Even if you regularly plug in your USB drive, you probably use only a fraction of its available storage. With the latest drives offering capacities of up to 2TB and super-fast USB 3.2 connectivity, there's a lot of storage space and speed potential going to waste. What's more, USB drives are now cheaper than ever – you can buy a 128GB model from Amazon for less than $20 – so it's a shame not to make the most of these handy little devices.

In this feature, we reveal 14 new ways to unlock the full potential of your USB drive, so you can use it for much more than transporting files. We provide step-by-step instructions for useful tasks such as booting a free portable version of Windows 11, locking your PC with a USB security key and running a powerful AI chatbot from your portable drive. Some tips require you to reformat your drive, so ensure you back up your data first.

## What you can do

- Run Windows 11 on any PC without overwriting Windows 10
- Switch easily between multiple versions of Linux
- Test new software safely in a USB-drive sandbox
- Create an emergency rescue kit to fix a malfunctioning PC
- Scan for malware threats usingcloud-based AI
- Carry a powerful AI assistant in your pocket
- Stream music and videos from a media server
- Store passwords securely in a  portable vault

# TRY NEW OPERATING SYSTEMS & SOFTWARE

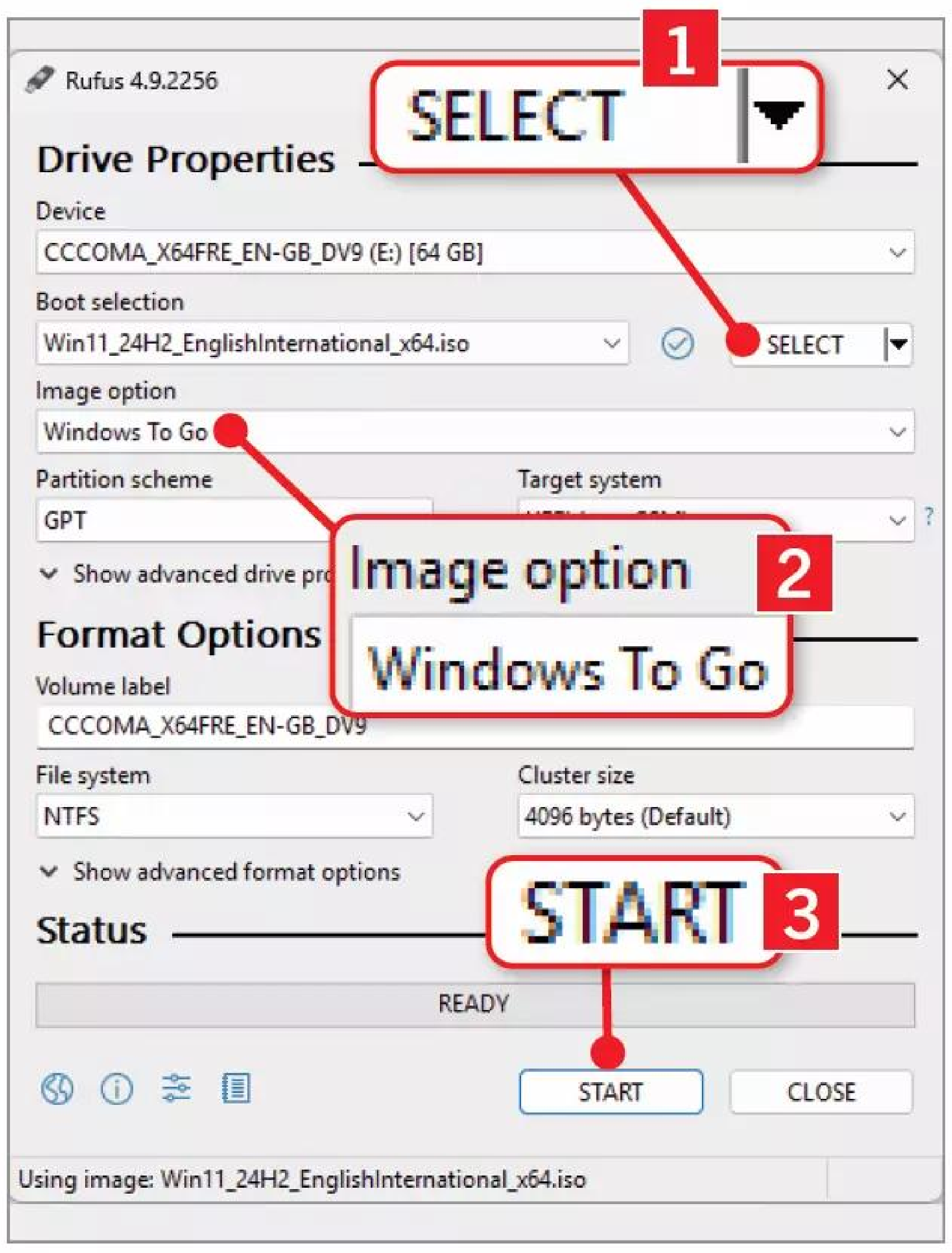
## 1 Boot a portable version of Windows 11

There are several benefits to creating a bootable version of Windows 11 on a USB drive. You can run the operating system on your current PC without overwriting Windows 10 (until you're ready), use it to access your files and software on other PCs, and potentially bypass Microsoft's restrictions for upgrading to Windows 11.

The latest ISO file for Windows 11 is 5.7GB in size, so you need a USB drive with a capacity of at least 16GB. An 8GB drive may have enough storage for the ISO, but you need extra space for boot files, Windows updates and any files and programs you add and download to the bootable version of the operating system. Newer USB drive with speedy connectivity (USB 3.0 or later) will ensure the portable OS runs almost as smoothly as it would on your main hard drive.

To download the Windows 11 ISO, go to Microsoft's Download Windows 11 page (**tinyurl.com/APC552win11iso**). In the 'Download Windows 11 Disk Image (ISO)' section, select 'Windows 11 multi-edition ISO' in the dropdown menu and click Download Now. Once your request has been verified, choose English International as the product language and click Confirm. Click '64-bit Download' to save the ISO file to your PC.

To make this version of Windows 11 bootable, download and run the brilliant free program Rufus (**https://rufus.ie/en**). Insert your USB stick and click Select (1 in our screenshot above right). Open the ISO file you downloaded, choose Windows To Go in the 'Image option' menu 2 and click Start 3.


Rufus 4.9.2256

Drive Properties

Device: CCCOMA_X64FRE_EN-GB_DV9 (E:) [64 GB]

Boot selection: Win11_24H2_EnglishInternational_x64.iso

Image option: Windows To Go

Partition scheme: GPT

Format Options

Volume label: CCCOMA_X64FRE_EN-GB_DV9

File system: NTFS

Cluster size: 4096 bytes (Default)

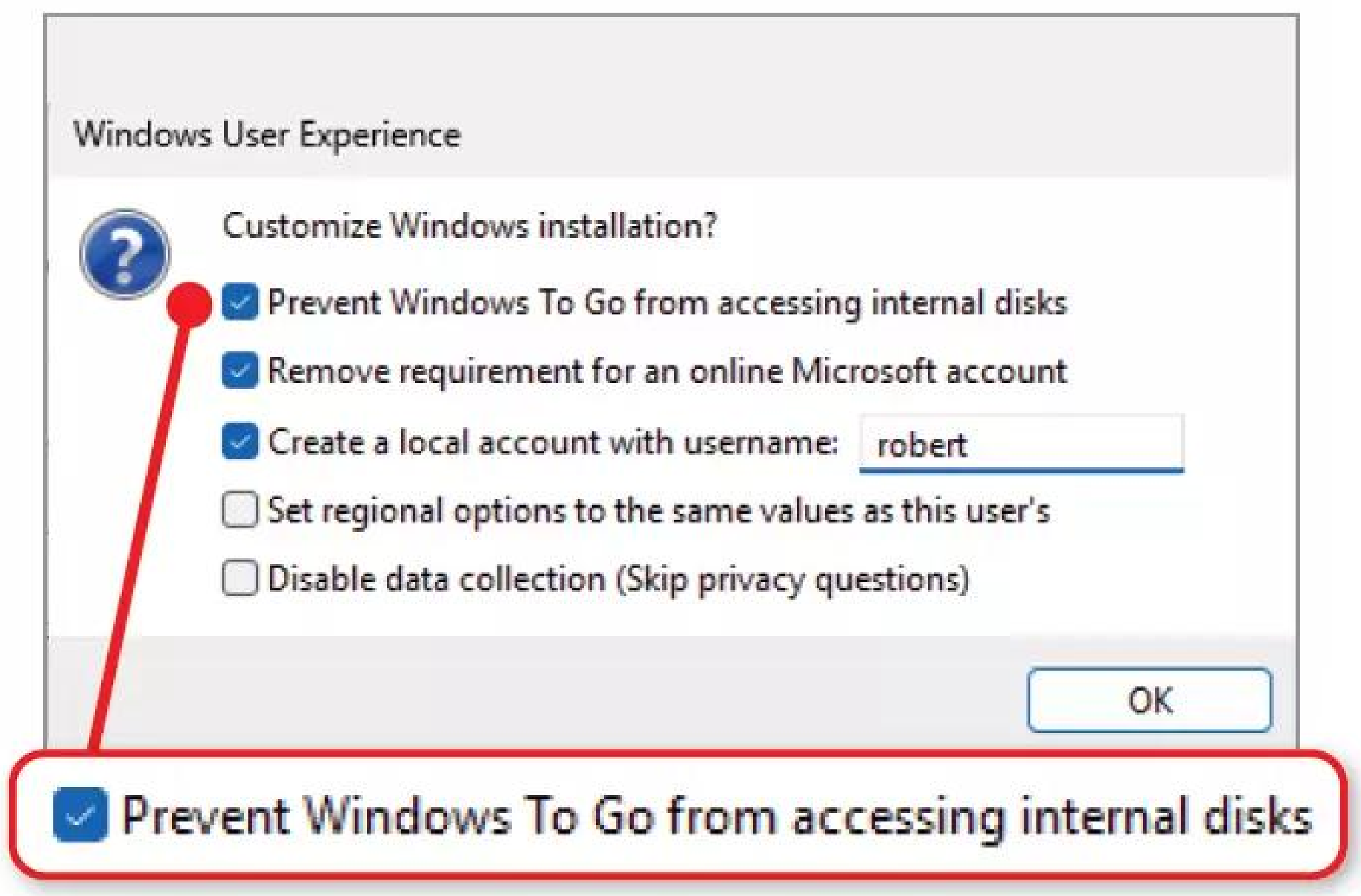
Status: READY

Using image: Win11_24H2_EnglishInternational_x64.iso

Use Rufus to create a bootable version of Windows 11 on a USB drive.

Select the version of Windows you want to install and, in the Windows User Experience box that opens, ensure you tick the option 'Prevent Windows To Go from accessing internal disks' (see screenshot above right). This will stop you overwriting Windows 10 or your current installation of Windows 11. You can also remove the requirement for an online Microsoft account and use a local one instead.

If you want to upgrade an unsupported Windows 10 PC, rather than create a portable version of Windows 11, choose 'Standard Windows installation' in the 'Image option' menu. Select 'Remove requirement for 4GB+ RAM, Secure Boot and TPM 2.0' in the Windows User Experience box.


Windows User Experience

Customize Windows installation?

☑ Prevent Windows To Go from accessing internal disks
☑ Remove requirement for an online Microsoft account
☑ Create a local account with username: robert
☐ Set regional options to the same values as this user's
☐ Disable data collection (Skip privacy questions)

Stop the portable version of Windows making changes to your PC.

Click 'OK' to install the ISO file to the USB stick and create a bootable OS. This takes about 20 minutes – click Close when done. You'll now need to change the PC's boot order to use your USB stick rather than an internal drive – see the box below left for instructions. This will boot Windows 11 from your USB stick and connect to your home network. The portable operating system will check for and install the latest updates and let you configure your privacy settings. Unplug the USB stick and restart your PC to revert to your usual Windows installation.

## 2 Switch between multiple Linux distros

As we explained in our 'Linux - the ultimate Windows 10 upgrade?' feature in Issue 546, there are lots of Linux distributions (distros) to choose from, with different interfaces and features. You can run them instead of Windows 10 now that support has ended. A large-capacity USB drive – preferably at least 64GB – gives you enough space to install multiple distros, so you can decide which version is best for you, or switch between them. When run from your USB drive, they won't interfere with each other or with your Windows installation.

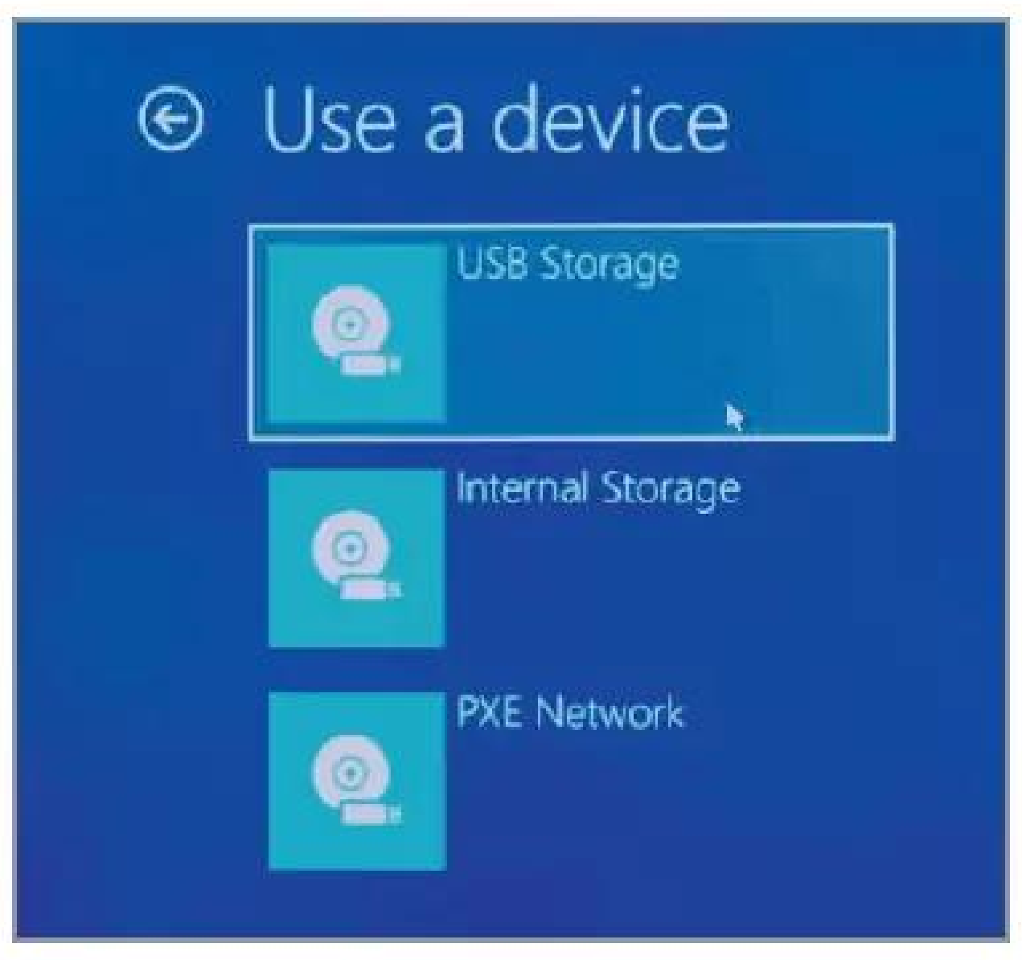
The easiest way to install multiple Linux distros on a single USB drive is to use the free tool Ventoy (**www.ventoy.net**). This multiboot USB creator saves you having to format or partition the drive each time you copy an ISO file to it, and lists ISOs in a menu so you can choose which one to boot.

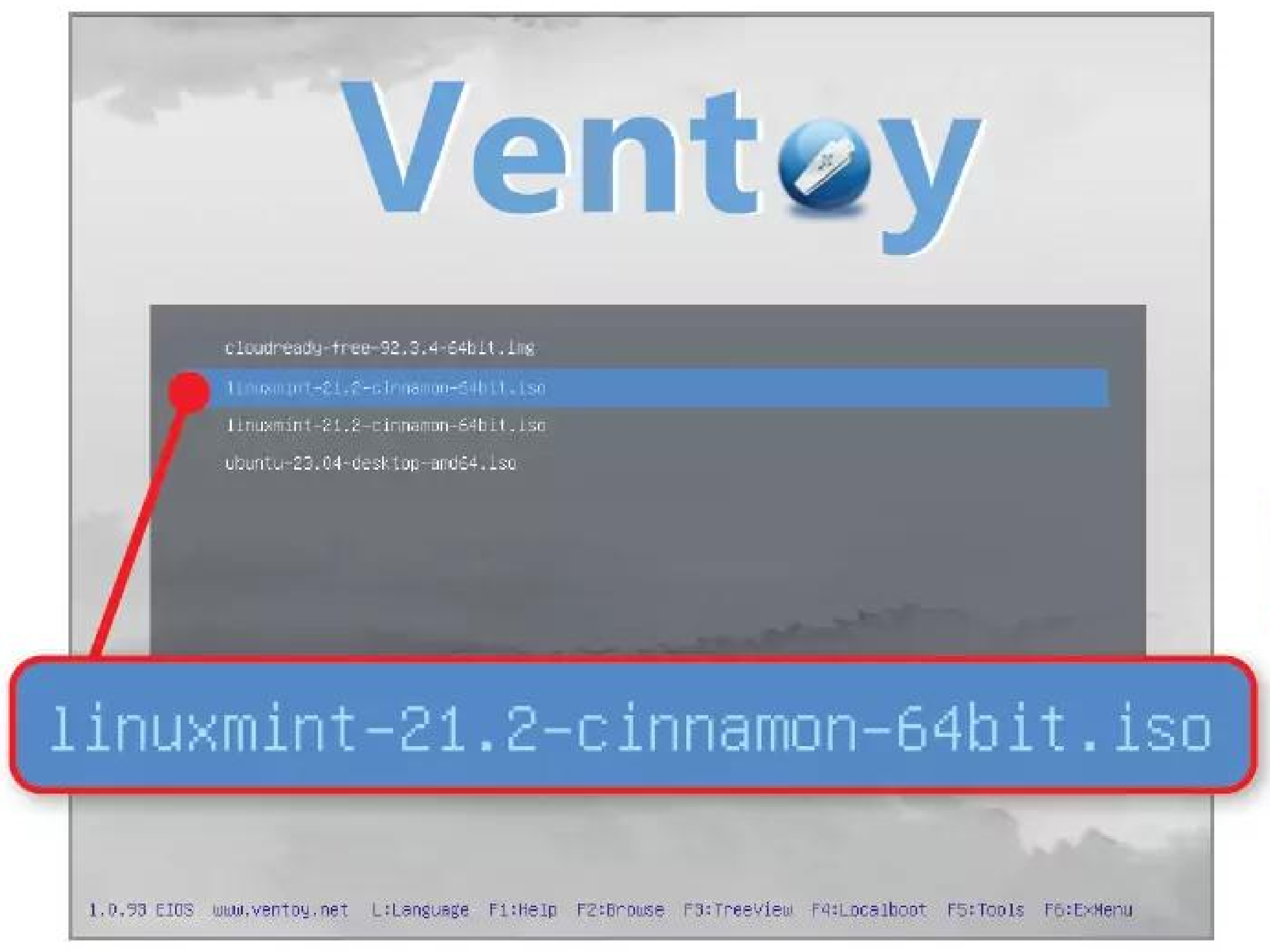
Download the Ventoy ZIP file from **www.ventoy.net/en/download.html**, extract its contents and double-click the Ventoy2Disk.exe file. Ensure your USB drive is listed in the Device menu and click Install. This will format the drive and rename it Ventoy. Close the Ventoy

## Boot directly from your USB drive

Some of our tips involve booting from a USB stick rather than your hard drive or SSD. This requires you to change your PC's boot order through the UEFI/BIOS. The steps to access the boot menu vary between PCs, but it usually involves pressing F1, F2, F8, F10, Esc or Del after restarting, then looking for 'Boot order' or something similar.

An easier way to boot from USB is to use the Windows Recovery Environment – also known as 'Advanced startup'. Open the Settings app and click 'Update & security' (in Windows 10) or System (in Windows 11) then Recovery. Click the 'Restart now' button in the 'Advanced start-up' section to load the Windows Recovery Environment. On the 'Choose an option' screen, select 'Use a device' and click USB Device or USB Storage (see screenshot).





```
cloudready-free-92.3.4-64bit.img
linuxmint-21.2-cinnamon-64bit.iso
linuxmint-21.2-cinnamon-64bit.iso
ubuntu-23.04-desktop-amd64.iso

1.0.98 EIOS  www.ventoy.net  L:Language  F1:Help  F2:Browse  F3:TreeView  F4:Localboot  F5:Tools  F6:ExMenu
```

Ventoy stores multiple Linux distros on a USB drive so you can choose which to boot.

program window, then open the Ventoy USB drive in a File Explorer window.

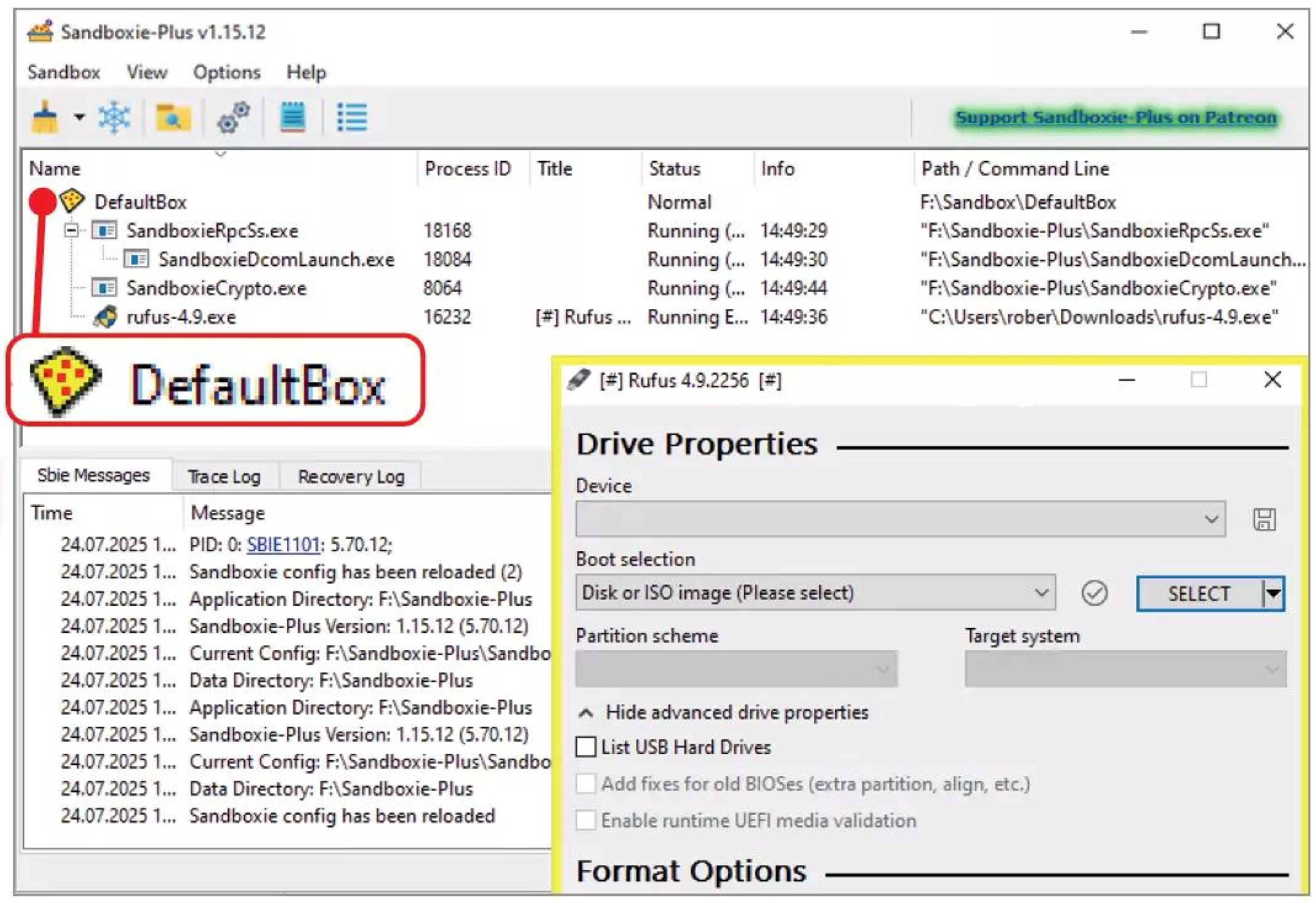
You can now download some Linux distros to add to the drive. Popular options include Linux Mint (Cinnamon Edition, **https://linuxmint.com**), Zorin OS (free Core version, **https://zorin.com/os/download**), Ubuntu Desktop (**https://ubuntu.com/download/desktop**) and the privacy-focused Tails (**https://tails.net**). The downloads are usually ISO disk images and can be a few gigabytes in size, which is why you need a large USB drive.

Once you've downloaded a distro ISO, drag it from your Downloads folder to the Ventoy USB drive, but don't open the file. Restart your PC to boot from the USB stick (see instructions on page 60) and Ventoy will launch, displaying the name of the Linux ISO. Any other distros you copy to the Ventoy drive will also be listed on this menu screen. Select a Linux distro (see screenshot above) to try it, but be careful not to install it on your PC.

Windows' Secure Boot feature may cause a 'security violation' message. To fix this, press Enter followed by any key except Enter, and select 'Enroll key from disk'. Press Enter again, choose VTOYUEFI and select ENROLL_THIS_KEY_IN_MOKMANAGER.cer, pressing Enter after each step. Choose 'Continue' then Yes followed by Reboot. Boot from the USB stick again, and this time Ventoy will load your Linux distro(s).

## 3 Test software safely in a sandbox

If you want to try a new program but you're worried it will make unwanted changes to your system – or even infect it with malware – running it in a sandbox is a sensible precaution. Limiting that sandbox to a USB drive is even safer, because it further isolates the program from your system.



```
Sandboxie-Plus v1.15.12
Name                          Process ID  Title        Status       Info      Path / Command Line
DefaultBox                                             Normal                 F:\Sandbox\DefaultBox
  SandboxieRpcSs.exe          18168                    Running (... 14:49:29  "F:\Sandboxie-Plus\SandboxieRpcSs.exe"
    SandboxieDcomLaunch.exe   18084                    Running (... 14:49:30  "F:\Sandboxie-Plus\SandboxieDcomLaunch...
  SandboxieCrypto.exe         8064                     Running (... 14:49:44  "F:\Sandboxie-Plus\SandboxieCrypto.exe"
  rufus-4.9.exe               16232       [#] Rufus ... Running E... 14:49:36  "C:\Users\rober\Downloads\rufus-4.9.exe"

Time              Message
24.07.2025 1...   PID: 0: SBIE1101: 5.70.12;
24.07.2025 1...   Sandboxie config has been reloaded (2)
24.07.2025 1...   Application Directory: F:\Sandboxie-Plus
24.07.2025 1...   Sandboxie-Plus Version: 1.15.12 (5.70.12)
24.07.2025 1...   Current Config: F:\Sandboxie-Plus\Sandbo
24.07.2025 1...   Data Directory: F:\Sandboxie-Plus
24.07.2025 1...   Application Directory: F:\Sandboxie-Plus
24.07.2025 1...   Sandboxie-Plus Version: 1.15.12 (5.70.12)
24.07.2025 1...   Current Config: F:\Sandboxie-Plus\Sandbo
24.07.2025 1...   Data Directory: F:\Sandboxie-Plus
24.07.2025 1...   Sandboxie config has been reloaded
```

[#] Rufus 4.9.2256 [#]

Drive Properties

Device

Boot selection: Disk or ISO image (Please select)

Partition scheme

Target system

Hide advanced drive properties

☐ List USB Hard Drives

☐ Add fixes for old BIOSes (extra partition, align, etc.)

☐ Enable runtime UEFI media validation

Format Options

Sandboxie Plus runs software in a secure sandbox on your USB drive.

The best free sandboxing tool is Sandboxie Plus (**https://sandboxie-plus.com**), which was recently updated to offer better support for testing portable programs. And while it's not strictly a portable program, you can run it from a USB drive. Download the Sandboxie-Plus EXE file from **https://sandboxie-plus.com/downloads** and double-click it to run the installer. Select 'Extract all files to a directory for portable use' and choose your USB drive as the destination folder.

Once all the files have extracted to your USB stick, double-click SandMan.exe and click OK to let Sandoxie Plus create the 'necessary services' for its portable mode. If you get an error message, click the Sandbox menu and choose Maintenance then Connect, and click Yes.

To run a program in a sandbox, drag its EXE file into the Sandboxie Plus window. You can also right-click it and choose Run Sandboxed. If you don't see that option, click the Options menu, select Global Settings and in the Shell Integration section tick 'Add 'Run Sandboxed' to the explorer context menu'.

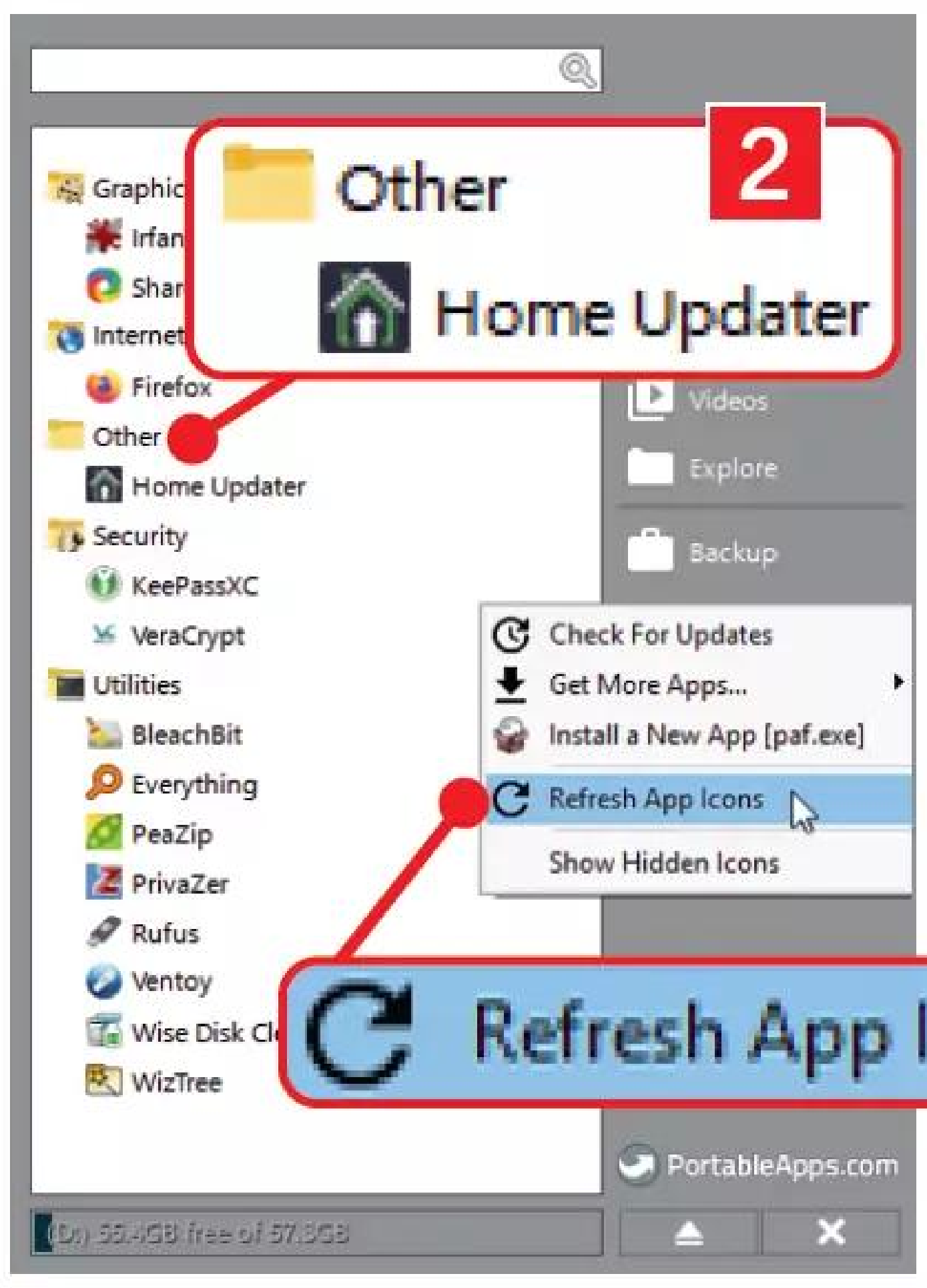
Either add the program to your DefaultBox (see screenshot above) or create a new sandbox, and click Yes when you see the Sandbox Start prompt. The sandboxed tool will run with a yellow border around its window. Anything it does will remain confined to the sandbox and your USB drive.

## 4 Store and update hundreds of programs

Many APC readers will be familiar with the fantastic software suite PortableApps.com (**portableapps.com**), which offers portable versions of over a thousand programs and games. Pick the tools you want from its Portable App Directory, then click Install to save them all to your USB drive. PortableApps.com will check for updates to these tools every time you launch it.

To find useful apps and games more easily, and make the most of your USB stick's capacity, click Apps in the PortableApps.com pop-up menu and choose Get More Apps. You can sort the list by title, category – including 'Graphics and Pictures', 'Music and Video', Internet, Office and Utilities – or new releases. Each tool's entry includes details of its download and install size.

You can also add your own USB tools to the suite, such as the new portable version of Patch My PC Home Updater. Create a new folder in the PortableApps folder on your USB stick (not the PortableApps.com folder) and give it a suitable name such as 'Extra tools'. Drag the EXE files for portable software into this folder. Open the PortableApps.com menu and choose Apps then Refresh App Icons (**1** in our screenshot below). The new program will appear in an Other category **2**, where you can launch it as you would the other tools. However, PortableApps.com won't update programs you add yourself – you'll need to do that manually.



Add the new portable version of Patch My PC Home Updater.

# FIX & PROTECT YOUR PC FOR FREE

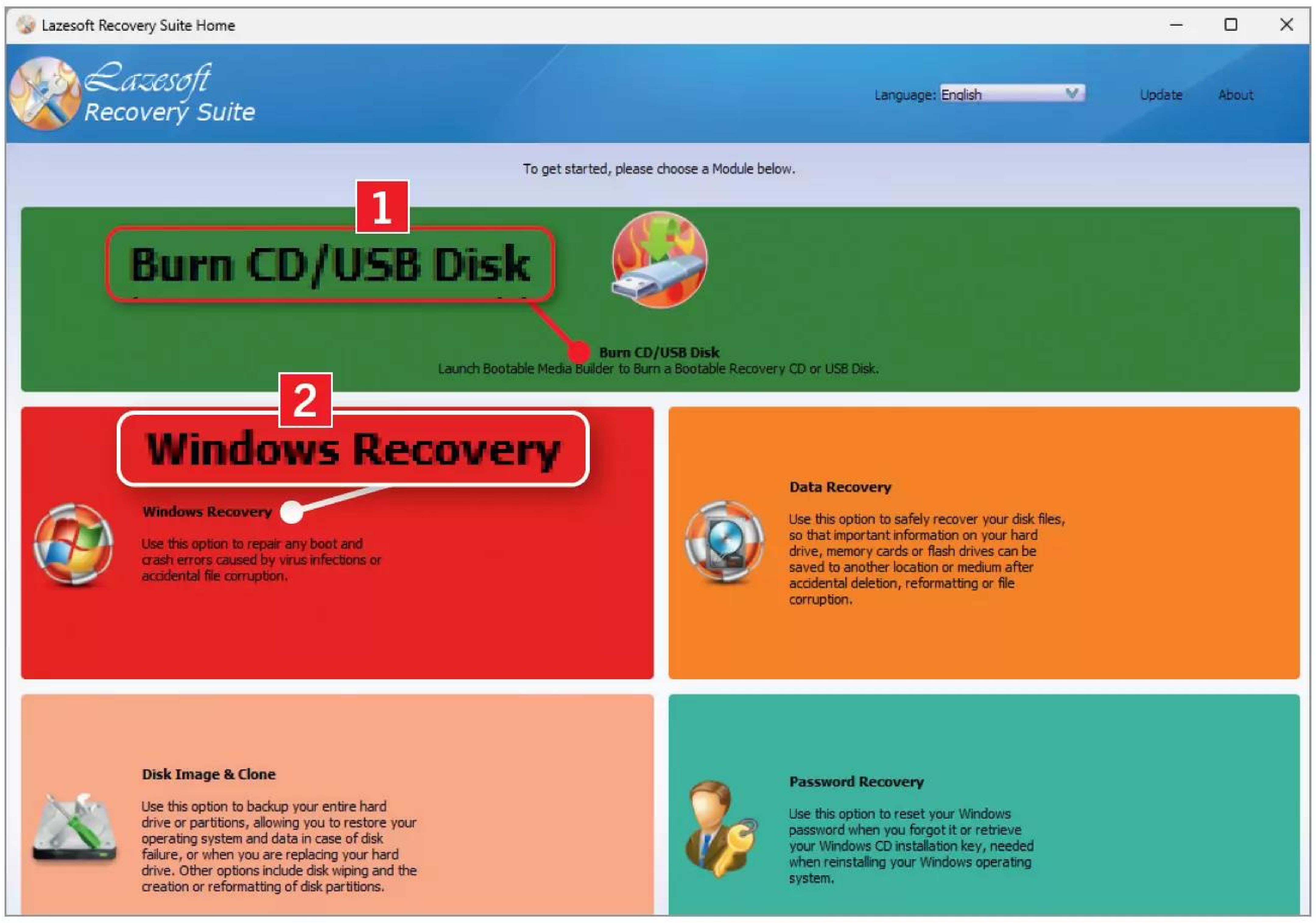
## 5 Create an emergency rescue kit

Turning a USB drive into an emergency rescue kit can help you fix PC problems when Windows won't start or isn't working properly, and could even save you money on professional repairs. There are several advanced tools for this purpose, such as Hiren's BootCD PE (**www.hirensbootcd.org**), but the easiest to use is Lazesoft Recovery Suite Home Edition (**tinyurl.com/APC552laze**). It's free for personal use and was recently updated with enhanced support for Windows 11.

The program gives you full access to a malfunctioning or non-bootable PC and fixes many common problems. Select 'Burn CD/USB Disk' on the home screen (**1** in our screenshot right), specify your Windows version and choose USB Flash. Click 'Start' to create your emergency rescue kit.

To access the repair kit, boot your PC from your USB drive and choose Lazesoft Live CD on the start-up screen. Click the Windows Recovery module **2** and select the drive you're having problems with.

Lazesoft's recovery tools include options for fixing the causes of crashes, performing a system restore, copying important data to another external drive and repairing corrupted system files. Click the One Click Fix tab – recommended for 'novice users' – to check for and fix common Windows boot errors. Note that Lazesoft Recovery Suite won't work if BitLocker encryption is enabled, and the free version can't fix the 'bootmgr is missing' error.



To get started, please choose a Module below.

**Burn CD/USB Disk**
Launch Bootable Media Builder to Burn a Bootable Recovery CD or USB Disk.

**Windows Recovery**
Use this option to repair any boot and crash errors caused by virus infections or accidental file corruption.

**Data Recovery**
Use this option to safely recover your disk files, so that important information on your hard drive, memory cards or flash drives can be saved to another location or medium after accidental deletion, reformatting or file corruption.

**Disk Image & Clone**
Use this option to backup your entire hard drive or partitions, allowing you to restore your operating system and data in case of disk failure, or when you are replacing your hard drive. Other options include disk wiping and the creation or reformatting of disk partitions.

**Password Recovery**
Use this option to reset your Windows password when you forgot it or retrieve your Windows CD installation key, needed when reinstalling your Windows operating system.

Lazesoft Recovery Suite creates an emergency rescue kit on your USB drive.

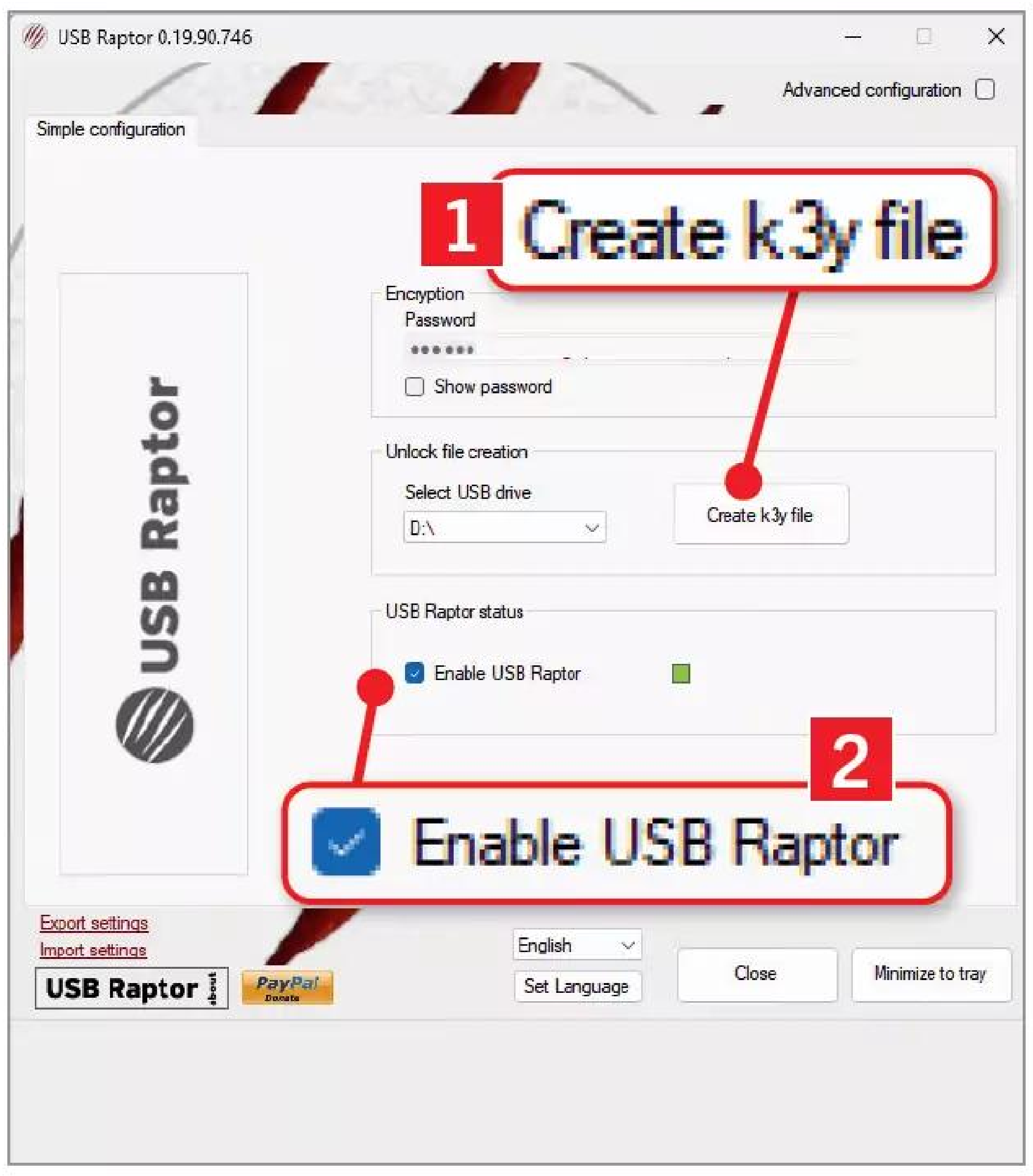
## 6 Lock your PC with a security key

Many websites and apps now let you protect your online accounts with a USB security key such as a Yubico YubiKey (**tinyurl.com/APC552yubico**). Although a standard USB stick can't replicate that type of two-factor authentication (2FA) because it lacks the required security chip, you can use one as a key to lock and unlock your PC. This will stop anyone but you accessing your system.

Download the free tool USB Raptor (**tinyurl.com/APC552raptr**), extract the contents of its ZIP file and run the installer. If it triggers a SmartScreen security warning, click 'More info' then 'Run anyway' – it's safe to use. Also click Allow to let it through the Windows Firewall, if prompted.

When the program opens, enter a password to encrypt your USB drive and click 'Create k3y file' (**1** in screenshot below). This file contains encrypted text USB Raptor reads to unlock a computer. Tick 'Enable USB Raptor' **2** and click Close.

Unplug your USB drive and your PC will lock and display a blank green screen. Plug it back in to unlock your PC. Click 'Advanced configuration' in USB Raptor's top-right corner to customise its behaviour, such as by running it on Windows startup, turning off your screen when locked and disabling or changing the locking and unlocking sounds.



Password: ••••••
☐ Show password
Select USB drive: D:\
☑ Enable USB Raptor
Language: English

USB Raptor lets you lock and unlock your PC using your USB drive.

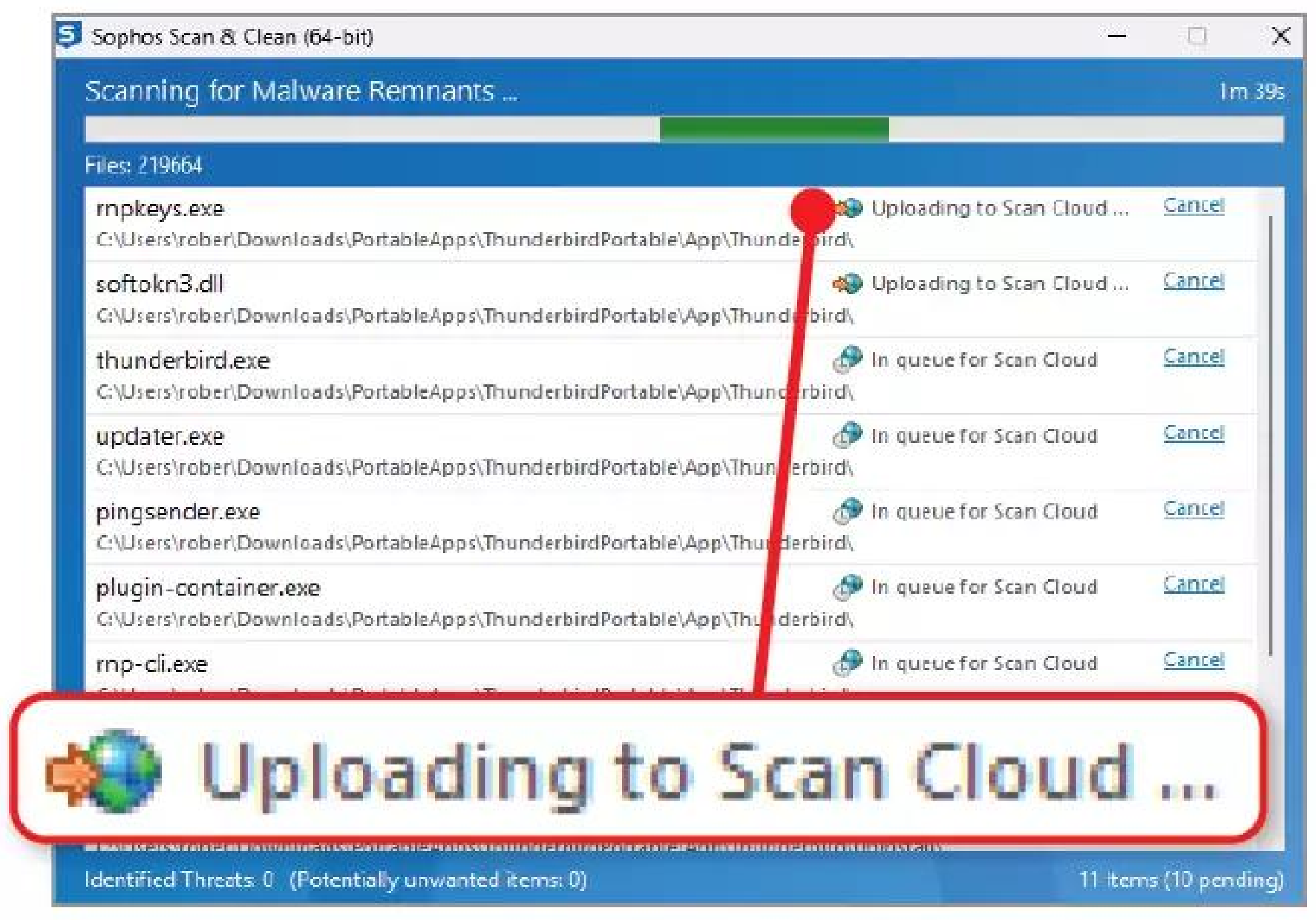
## 7 Scan for malware using AI

As antivirus software has to keep its virus definitions up to date and provide real-time protection, it needs to be installed on your PC. However, you can still run extra security tools from a USB drive for added peace of mind.

Sophos Scan & Clean (**tinyurl.com/APC552sophos**) is one of the best free options, combining a simple design with fast, thorough scans. It uses cloud-based AI (see screenshot below) to detect malware, including zero-day threats, rootkits and PUPs. You can then either delete or quarantine anything it finds.

Copy its EXE file to your USB drive and double-click it to launch the program and start a scan – there's no need to install it. Sophos Scan & Clean updates automatically each time you run it.

Sophos asks you to enter a name and email address to download Scan & Clean, but you can use fake details because the company doesn't verify them.

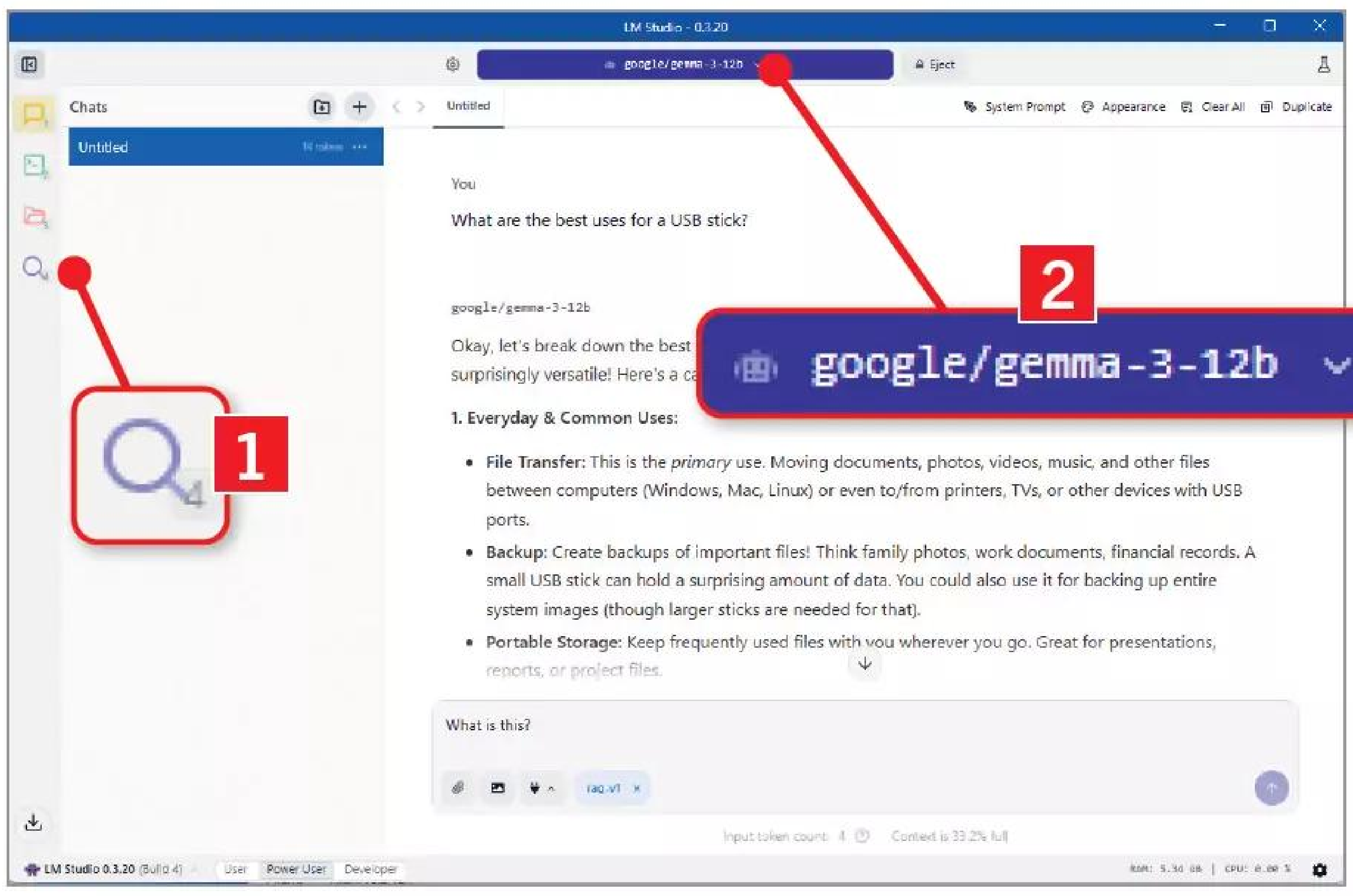


```
Scanning for Malware Remnants ...                                  1m 39s
Files: 219664
rnpkeys.exe                                                   Uploading to Scan Cloud ...
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
softokn3.dll                                                  Uploading to Scan Cloud ...
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
thunderbird.exe                                               In queue for Scan Cloud
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
updater.exe                                                   In queue for Scan Cloud
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
pingsender.exe                                                In queue for Scan Cloud
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
plugin-container.exe                                          In queue for Scan Cloud
C:\Users\rober\Downloads\PortableApps\ThunderbirdPortable\App\Thunderbird\
rnp-cli.exe                                                   In queue for Scan Cloud
Identified Threats: 0  (Potentially unwanted items: 0)       11 items (10 pending)
```

Sophos Scan & Clean detects and removes malware using cloud-based AI.

# ACCESS AI TOOLS & EMAIL ON THE GO

## 8 Carry an AI chatbot in your pocket



You

What are the best uses for a USB stick?

google/gemma-3-12b

Okay, let's break down the best … surprisingly versatile! Here's a ca…

1. Everyday & Common Uses:

- **File Transfer:** This is the *primary* use. Moving documents, photos, videos, music, and other files between computers (Windows, Mac, Linux) or even to/from printers, TVs, or other devices with USB ports.
- **Backup:** Create backups of important files! Think family photos, work documents, financial records. A small USB stick can hold a surprising amount of data. You could also use it for backing up entire system images (though larger sticks are needed for that).
- **Portable Storage:** Keep frequently used files with you wherever you go. Great for presentations, reports, or project files.

What is this?

Chat to the AI tool in the main LM Studio window and download more models.

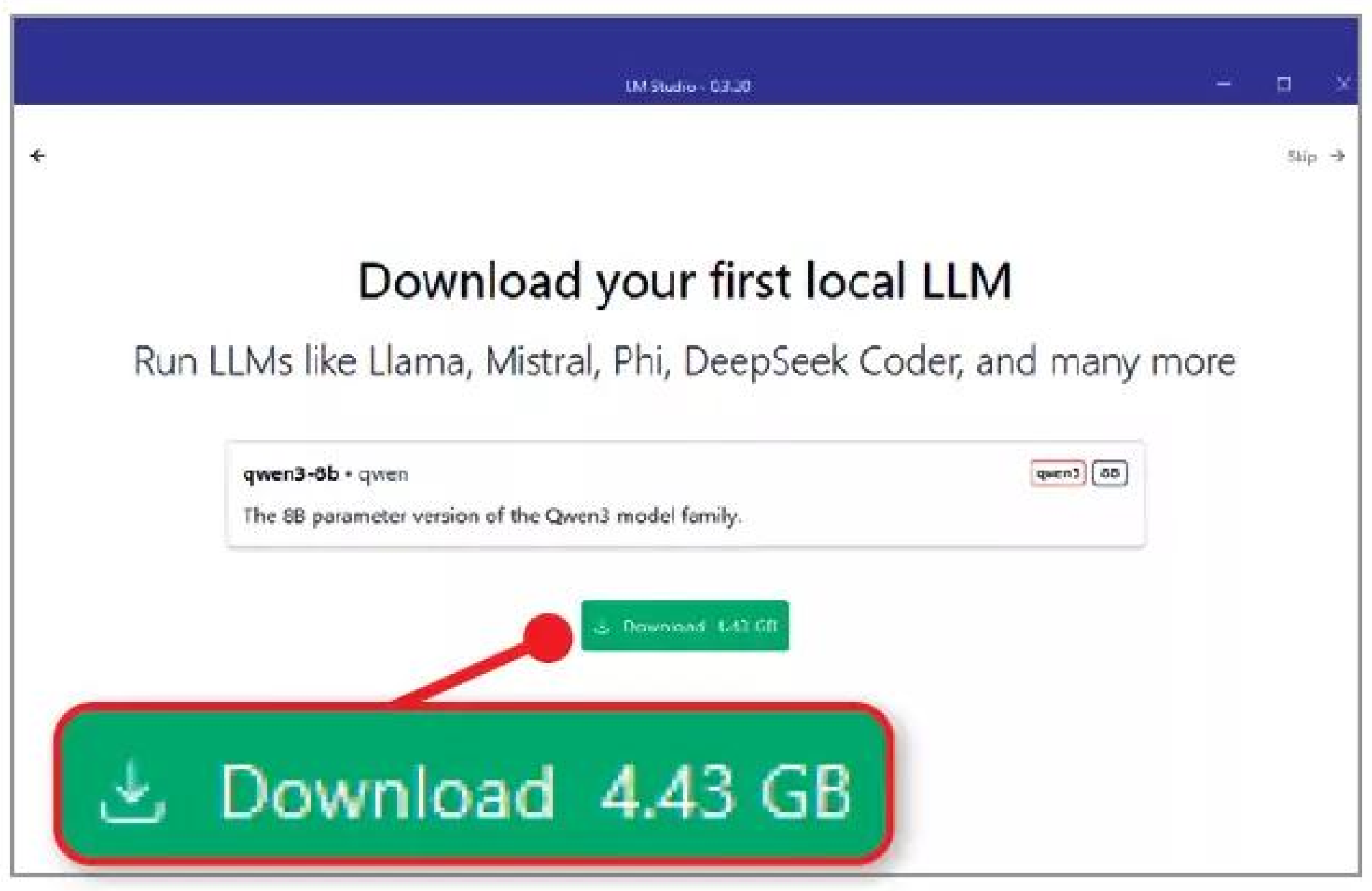
Although you can chat to your favourite AI assistant in your browser or its mobile app – or on your PC if it has a Windows version – there are advantages to running a chatbot from a USB drive. The details of your chats won't be stored on your PC or phone, you may be able to use the AI tool offline – so your data stays private rather than being uploaded to cloud servers – and you can access the chatbot on any computer you plug your drive into.

ChatGPT, Gemini and the other leading AI assistants don't have portable versions, but you can run large language models (LLMs) from your USB drive using the free LM Studio (**https://lmstudio.ai**). You'll need a large-capacity USB drive because, while LM Studio only takes up around 800MB of storage, the LLMs are massive – from 4GB to 20GB in size. It's also essential that your drive is fast so the chatbot can process and respond to your requests quickly (it will still be slower than chatting in your browser or an app).

To run LM Studio from your USB drive, download its EXE file to your PC and install the program to a folder on your portable drive. Once installed, tick 'Run LM Studio' and click Finish, or double-click the 'LM Studio.exe' file in the software's folder.

Click 'Let's get started' and select Power User on the 'Choose your level' screen. You can now download an LLM (see screenshot below). LM Studio will suggest the most suitable model for your drive. Untick the box 'Enable local LLM service on login' because this runs that chatbot automatically when you log into your PC, so it won't work on a USB drive.

Once the download is complete, click Load Model and start chatting. Depending on the LLM, you may be able to upload files and images for analysis. You can download more language models by clicking the Discover icon (**1** in our screenshot above). These include Mistral, DeepSeek (a private version that won't collect your data) and Gemma, which is built by Google and uses the same AI technology as Gemini.


LM Studio - 0.3.20
Skip
Download your first local LLM
Run LLMs like Llama, Mistral, Phi, DeepSeek Coder, and many more
qwen3-8b • qwen
qwen3
8B
The 8B parameter version of the Qwen3 model family.
Download 4.43 GB

Download an AI model to LM Studio to run a chatbot from your USB drive.

Switch between the models you've downloaded by clicking the menu at the top of LM Studio's interface **2**. Click Eject to unload an LLM. Most of them work offline, and your conversations will be confined to your USB drive. Plug the drive into another PC to launch LM Studio without needing to install the software.

By default, LM Studio saves models to the current PC rather than your USB drive, so you would need to download them again when using another computer. To make the LLMs portable, click the My Models icon in the sidebar and change the Models Directory to a dedicated folder on your USB drive (not the LM Studio installation folder). You can add LLMs you've already downloaded by copying the 'lmstudio-community' folder from C:/Users/[username]/.lmstudio/hub/models to the new folder.

When you run LM Studio on a new PC, click the Power User tab then Discover, and change the My Models Directory to the folder on your USB stick. This will load the language models you previously downloaded to the portable drive.

## 9 Access your email securely on any PC

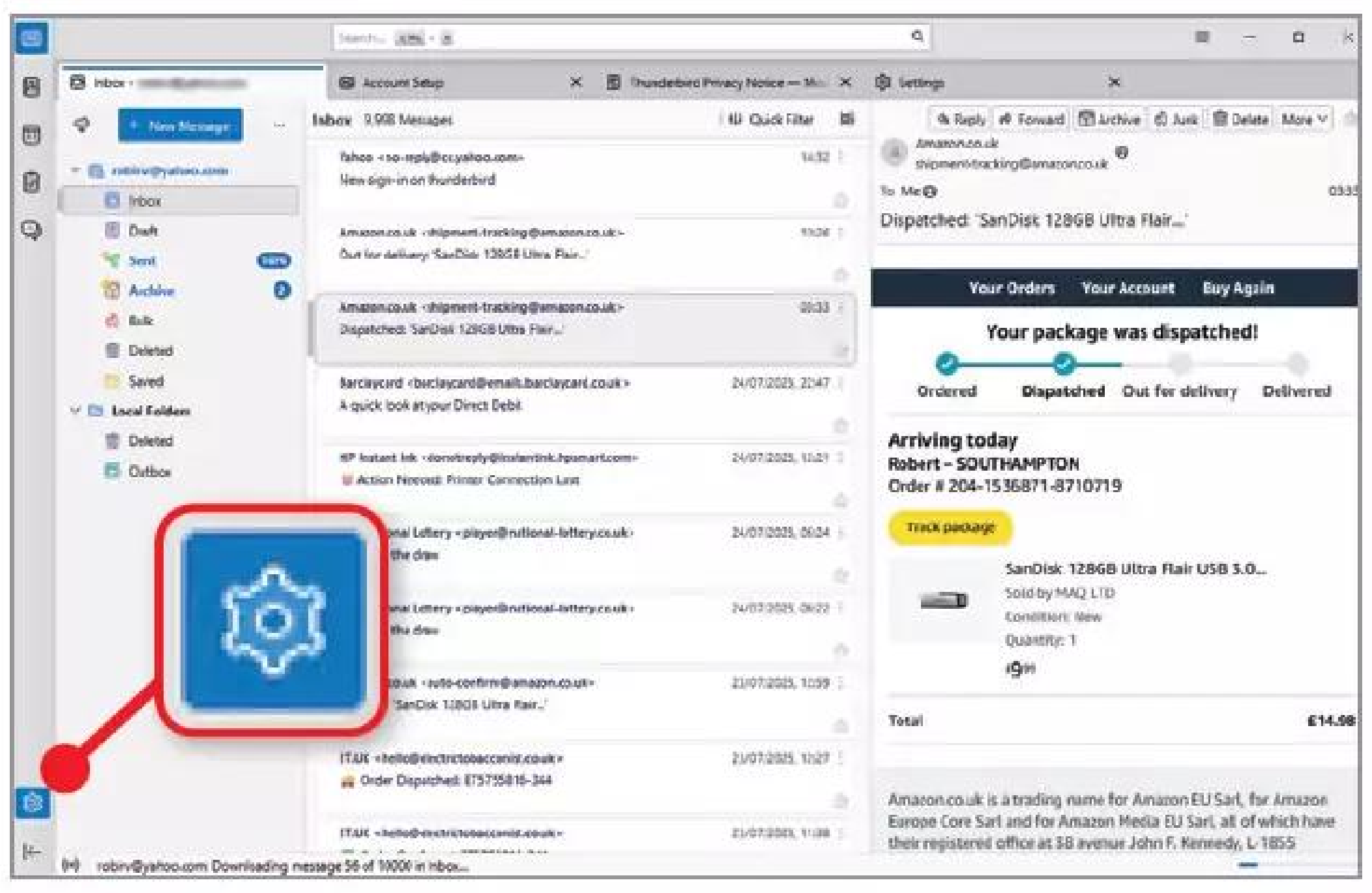
You might question the need for a portable email program – after all, you can access your inbox in your browser, as well as in your email provider's mobile app. But sending and receiving messages on a PC other than your own is a security risk, while composing emails on a phone is fiddlier than using a proper keyboard.

A USB drive offers a safe and convenient way to carry your messages everywhere you go, and read and reply to them on a big screen. The only effective way to set this up is through PortableApps.com, which offers a portable and regularly updated edition of Mozilla Thunderbird (**tinyurl.com/APC552thunder**). It's the only reliable portable email client that's still updated.

You can add your Gmail, Outlook or Yahoo Mail account to the program to access your emails, folders and contacts, or import the data from another email client, including an existing installation of Thunderbird. The portable tool will check for new emails automatically.

You'll be able to store many years' worth of messages on a large-capacity USB drive (if you choose POP3 rather than IMAP as the account type), so make sure Thunderbird saves them to the portable drive and not your PC. Click the Settings cog (see screenshot below) and choose Account Settings then Local Folders. In the Message Storage section, click the Browse button next to Local Directory and either choose or create a folder on your USB drive.

Thunderbird Portable supports end-to-end encryption to keep your messages private. To activate this and generate an OpenPGP key on your USB drive, select End-To-End Encryption in Account Settings.



Thunderbird Portable is now the only email client designed for USB drive.

# ENHANCE YOUR PHOTOS, VIDEOS & MUSIC

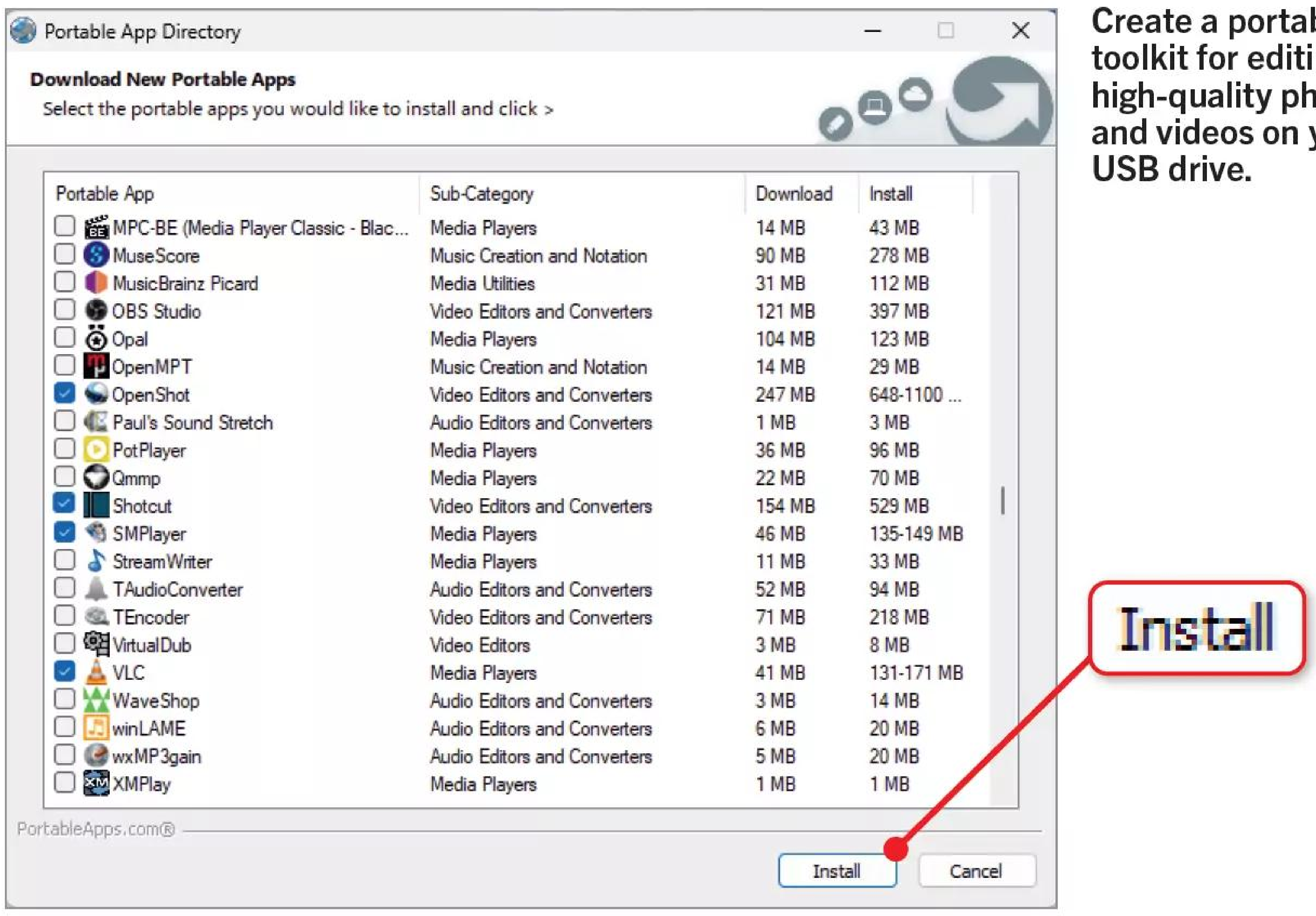
## 10 Store higher-quality photos and videos

A USB drive with 64GB or more of storage is invaluable for photographers and video makers. As well as giving you the space to back up thousands of images and videos, it lets you save them at high quality, rather than compress files to save storage.

The free program RawTherapee Portable, available through PortableApps.com (**tinyurl.com/APC552raw**) and its own website (**https://rawtherapee.com**), runs from a USB drive so you can edit photos without losing quality and maintain their true colour and dynamic range. If you find the program too complicated, the excellent and easy-to-use image editor PhotoDemon is another option available through PortableApps.com (**tinyurl.com/APC552demon**), as is our favourite free image viewer IrfanView (**tinyurl.com/APC552irfan**). These offer the same features and updates as their desktop versions and give you a portable photo-editing toolkit you can use on any computer, without installing anything.

Similarly, you can store and edit large videos with 4K resolutions and high frame rates on your USB drive by using portable tools. The brilliant free video editors Shotcut (**tinyurl.com/APC552shotcut**) and OpenShot (**tinyurl.com/APC552openshot**) are available through PortableApps.com, as is the popular media player VLC (**tinyurl.com/APC552vlc**).

All these programs have been updated recently, making them even more powerful tools for your stick. Locate them in the 'Music and Video' section of the Portable App Directory, and image-editing programs in the 'Graphics and Pictures' section, then click Install to add them to your USB drive. If you also want to edit audio files, you can download the superb free audio editor Audacity (**tinyurl.com/APC552audacity**) through PortableApps.com, too.


Portable App Directory

**Download New Portable Apps**
Select the portable apps you would like to install and click >

| Portable App | Sub-Category | Download | Install |
|---|---|---|---|
| ☐ MPC-BE (Media Player Classic - Blac... | Media Players | 14 MB | 43 MB |
| ☐ MuseScore | Music Creation and Notation | 90 MB | 278 MB |
| ☐ MusicBrainz Picard | Media Utilities | 31 MB | 112 MB |
| ☐ OBS Studio | Video Editors and Converters | 121 MB | 397 MB |
| ☐ Opal | Media Players | 104 MB | 123 MB |
| ☐ OpenMPT | Music Creation and Notation | 14 MB | 29 MB |
| ☑ OpenShot | Video Editors and Converters | 247 MB | 648-1100 ... |
| ☐ Paul's Sound Stretch | Audio Editors and Converters | 1 MB | 3 MB |
| ☐ PotPlayer | Media Players | 36 MB | 96 MB |
| ☐ Qmmp | Media Players | 22 MB | 70 MB |
| ☑ Shotcut | Video Editors and Converters | 154 MB | 529 MB |
| ☑ SMPlayer | Media Players | 46 MB | 135-149 MB |
| ☐ StreamWriter | Media Players | 11 MB | 33 MB |
| ☐ TAudioConverter | Audio Editors and Converters | 52 MB | 94 MB |
| ☐ TEncoder | Video Editors and Converters | 71 MB | 218 MB |
| ☐ VirtualDub | Video Editors | 3 MB | 8 MB |
| ☑ VLC | Media Players | 41 MB | 131-171 MB |
| ☐ WaveShop | Audio Editors and Converters | 3 MB | 14 MB |
| ☐ winLAME | Audio Editors and Converters | 6 MB | 20 MB |
| ☐ wxMP3gain | Audio Editors and Converters | 5 MB | 20 MB |
| ☐ XMPlay | Media Players | 1 MB | 1 MB |

**Create a portable toolkit for editing high-quality photos and videos on your USB drive.**

## 11 Record live TV from your smart TV

Set-top boxes for recording TV shows are increasingly hard to come by, but you can potentially turn a USB drive into a personal video recorder (PVR). You'll need a TV with a built-in recording function – as most smart TVs have now – and a portable drive with a big enough capacity (at least 64GB) to store lots of programmes. Ideally it should be USB 3.0 or faster for seamless recording.

First you'll need to format the USB drive through your TV so it can support and play video files. The formatting process and file system – such as NTFS, FAT32 or exFAT – will differ between TV makes and models, but you should find help on the manufacturer's support site. If your TV is quite old, search for its manual on Manuals Lib (**www.manualslib.com**).

Insert the USB drive into a USB port on your TV (see photo below), open the Settings menu and look for an option relating to recording, formatting or registering the drive.

Once you've set up the drive, you can usually start recording by pressing the Rec button on your TV's remote, or by selecting that option on screen. On recent Samsung TVs, for example, press the 123 button then Record. You may even be able to schedule recordings using your TV's electronic programme guide (EPG). Press the Guide button on the remote, find and select the programme you want to save, then choose Record.

Note that some TVs will only record to an external hard drive rather than a USB drive. Also, due to encryption, you may not be able to play your recordings on your PC – only the TV you recorded them from. The feature uses your TV's Freeview tuner, which means you can record any programme broadcast for free on those platforms, but not content from streaming services.

USB IN
3
HDMI
USB IN
HDMI (4K@120Hz) IN
LAN
RS-232C (SVC ONLY)
ANTENNA /CABLE IN
OPTICAL DIGITAL AUDIO OUT

Credit: LG

**Plug a USB drive into your TV and format it to record live TV shows.**

## Should you buy a USB 4.0 drive?

CERTIFIED USB 40 Gbps

USB 4.0 is the latest USB standard, offering incredible (though theoretical) transfer speeds of up to 40Gbps. However, while USB drives promising USB 4.0 connectivity have started appearing on online marketplaces such as AliExpress, they should be treated with scepticism.

Most of these devices are (often deliberately) mislabelled USB 3.2 sticks, which won't deliver 40Gbps speeds. True USB 4.0 drives are currently rare and expensive (over $500), and even if you do buy one you won't enjoy the performance benefits unless your PC has USB 4.0 ports. Many computers now have Thunderbolt 3 or 4 ports, which also offer transfer speeds of up to 40Gbps, but plugging in a USB 4.0 drive won't get near that figure.

It's best to wait until genuine USB 4.0 devices become more widely available, which should bring prices down. USB 3.0 and above should prove fast enough for the tips in this feature.

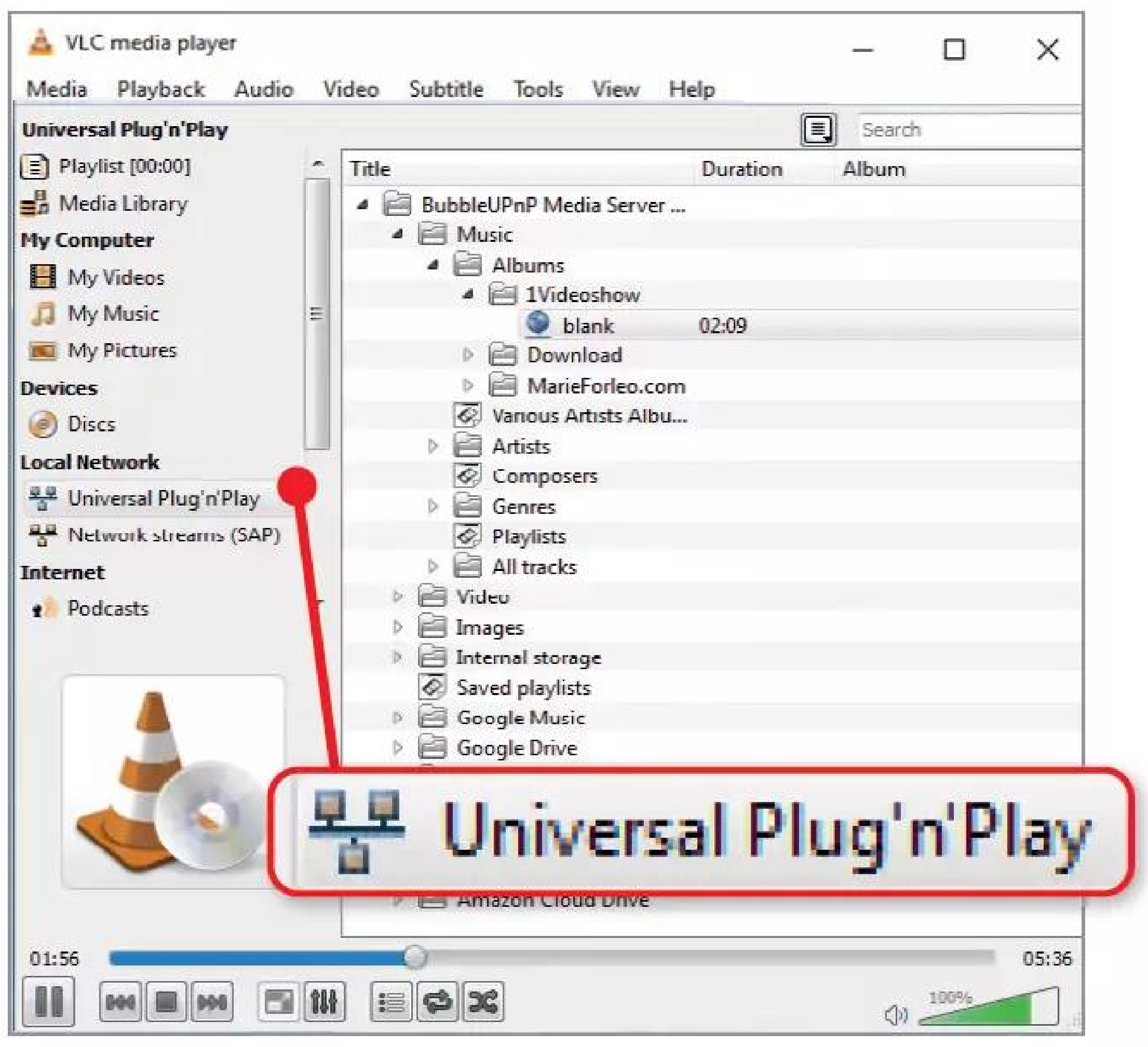
## 12 Set up your own media server

Storing music and videos on a USB drive gives you instant access to your entertainment wherever you can plug it in, such as on another computer, on a compatible smart TV or in your car. While you're at home, you can even use the drive as a media server to stream music, films and TV programmes to other devices on your network.

To do so, plug the USB drive into a USB port on your router (assuming it has one – some ISP-supplied routers don't). The drive should be formatted as NTFS or exFAT and contain all the audio and video files you want to stream. Next, sign into your router's web interface through your PC browser and look for a USB Settings or USB Application section. Enable the option for Media Server, DLNA Server or similar and choose the folders you want to share on the USB drive. Click Apply or Save to set up your media server.

The best way to stream music and videos from the drive is to use VLC Media Player (**tinyurl.com/APC552vlc**), which is available for PCs, mobile devices and smart TVs powered by Android or Google TV, and makes it easy to connect to a DLNA server. In VLC for Windows, click the View menu and choose Playlist. Select 'Universal Plug 'n' Play' in the Local Network section (see screenshot right) and VLC will scan for DLNA/UPnP servers on your network. Once it has detected your USB-drive server, double-click it to browse and play its contents.

In the VLC app for Android and iOS, tap the Browse tab to find and connect to the DLNA server under Local Network.


VLC media player
Media Playback Audio Video Subtitle Tools View Help
Universal Plug'n'Play
Playlist [00:00]
Media Library
My Computer
My Videos
My Music
My Pictures
Devices
Discs
Local Network
Universal Plug'n'Play
Network streams (SAP)
Internet
Podcasts
Title Duration Album
BubbleUPnP Media Server ...
Music
Albums
1Videoshow
blank 02:09
Download
MarieForleo.com
Various Artists Albu...
Artists
Composers
Genres
Playlists
All tracks
Video
Images
Internal storage
Saved playlists
Google Music
Google Drive
Amazon Cloud Drive
Universal Plug'n'Play
01:56
05:36

Stream music and videos from a USB drive plugged into your router.

The same instructions apply to the VLC app on smart TVs (updated in May) and streaming sticks that let you install it from their app stores.

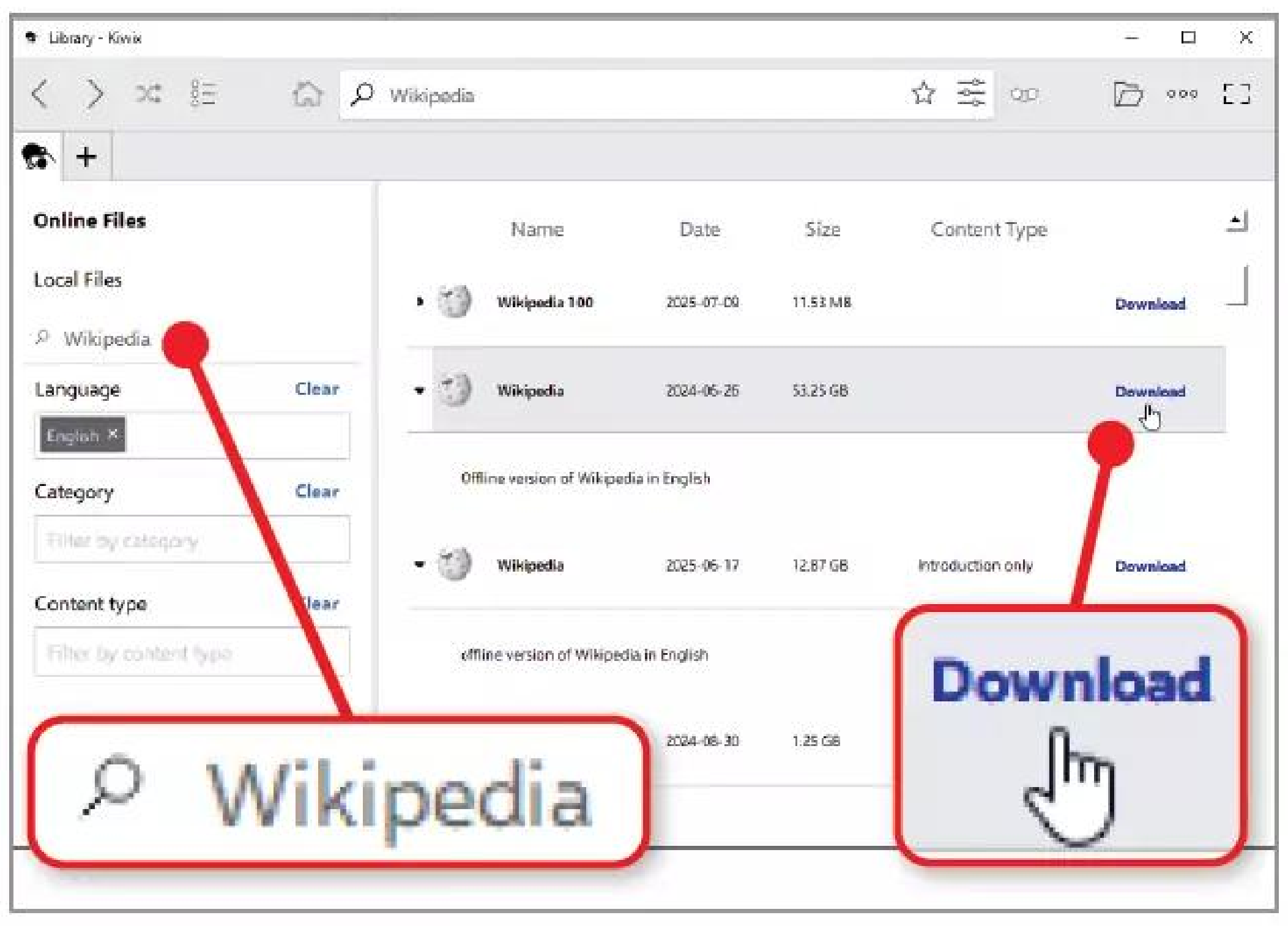
## STORE USEFUL WEBSITES AND PASSWORDS

## 13 Download websites to browse offline

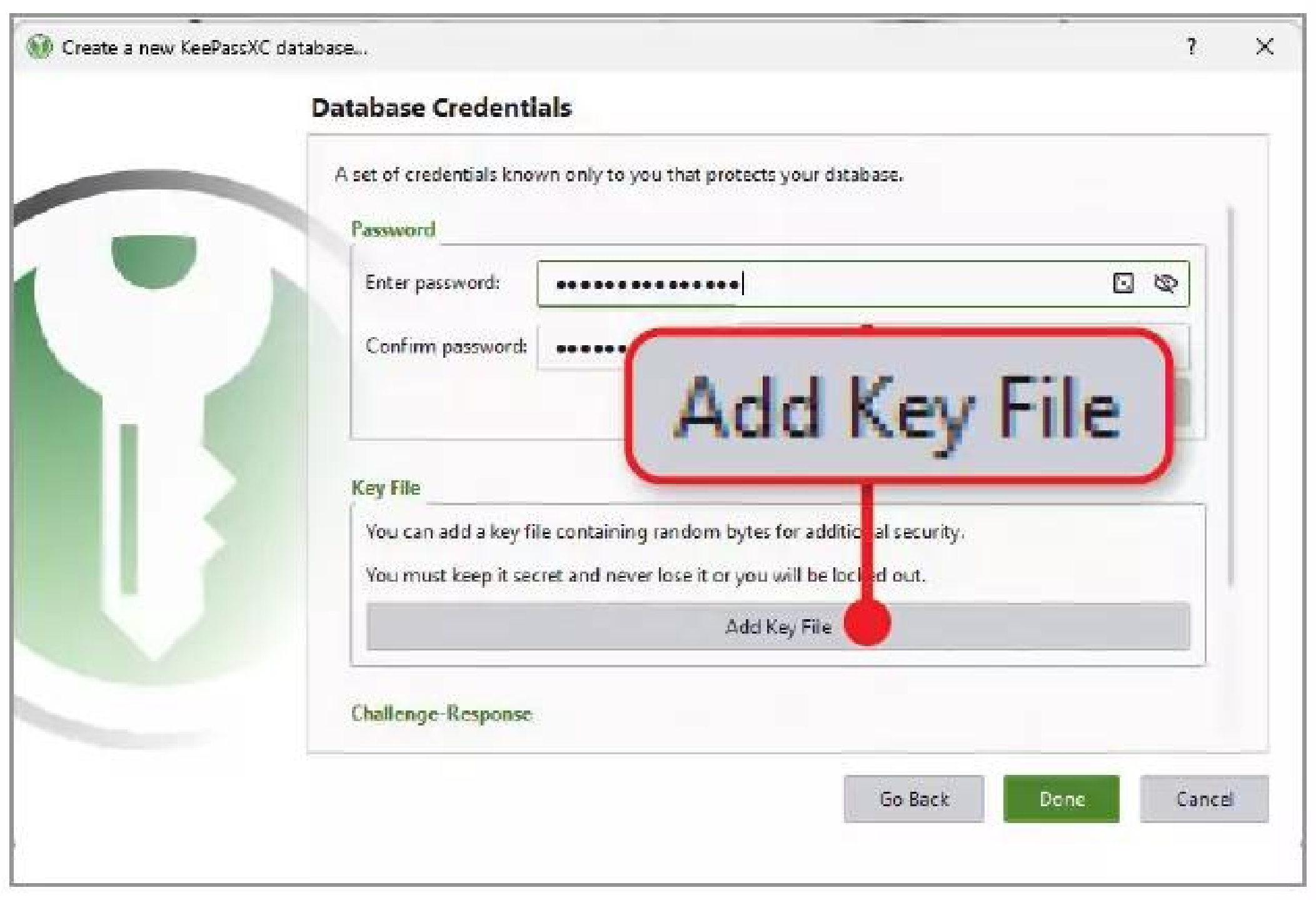
As your USB drive doesn't require an internet connection, it can be a lifesaver when you can't get online. As well as accessing files stored on it, you can download websites to browse offline.

The best tool for this job is Kiwix (**kiwix.org/en**), which lets you download the whole of Wikipedia as a 53GB file. If that seems excessive, smaller downloads are available that lack pictures and focus on the most popular pages. A hidden tip not many people know is that you can use Kiwix to download every free ebook from Project Gutenberg (83GB) so you'll always have something to read.

To use Kiwix, extract the contents of its ZIP file to your USB drive and double-click 'kiwix-desktop.exe'. If you see an error message, double-click 'vc_redist.x64.exe' to install Microsoft Visual C++ runtime. When the program opens, click Download next to your preferred Wikipedia option (see screenshot below left) or another resource to save it to your USB drive. Kiwix saves the files in its own ZIM format and they open in its browser.


Library - Kiwix
Wikipedia
Online Files
Local Files
Wikipedia
Language
Clear
English ×
Category
Clear
Filter by category
Content type
Filter by content type
Name
Date
Size
Content Type
Wikipedia 100
2024-07-09
11.93 MB
Download
Wikipedia
2024-06-25
53.25 GB
Download
Offline version of Wikipedia in English
Wikipedia
2025-06-17
12.87 GB
Introduction only
Download
offline version of Wikipedia in English
2024-06-30
1.35 GB
Wikipedia
Download

Use Kiwix to download the whole of Wikipedia to your USB stick


Create a new KeePassXC database...
Database Credentials
A set of credentials known only to you that protects your database.
Password
Enter password:
Confirm password:
Add Key File
Key File
You can add a key file containing random bytes for additional security.
You must keep it secret and never lose it or you will be locked out.
Add Key File
Challenge-Response
Go Back
Done
Cancel

KeePass XC Portable encrypts passwords you store on a USB drive.

## 14 Create a password vault

Storing sensitive data such as passwords on a USB drive may sound risky because it could get lost or stolen. However, by encrypting it you can create a secure portable vault that contains your logins and other important information.

KeePass XC Portable, available through PortableApps.com and its own website (**https://keepassxc.org**), makes this easy. Create a database, set the encryption level and enter a master password. You can also click 'Add additional protection' then Add Key File (see screenshot above) to generate or choose a 'key file' to further secure your database – store this on a separate drive. In March KeePass was updated to work with Proton Pass, making it even more useful.

Once you've saved your database on the stick, you can add usernames, passwords and other details – and even import data, including passkeys, from other password managers. Only you will be able to unlock your database using your master password and optional key file. ■

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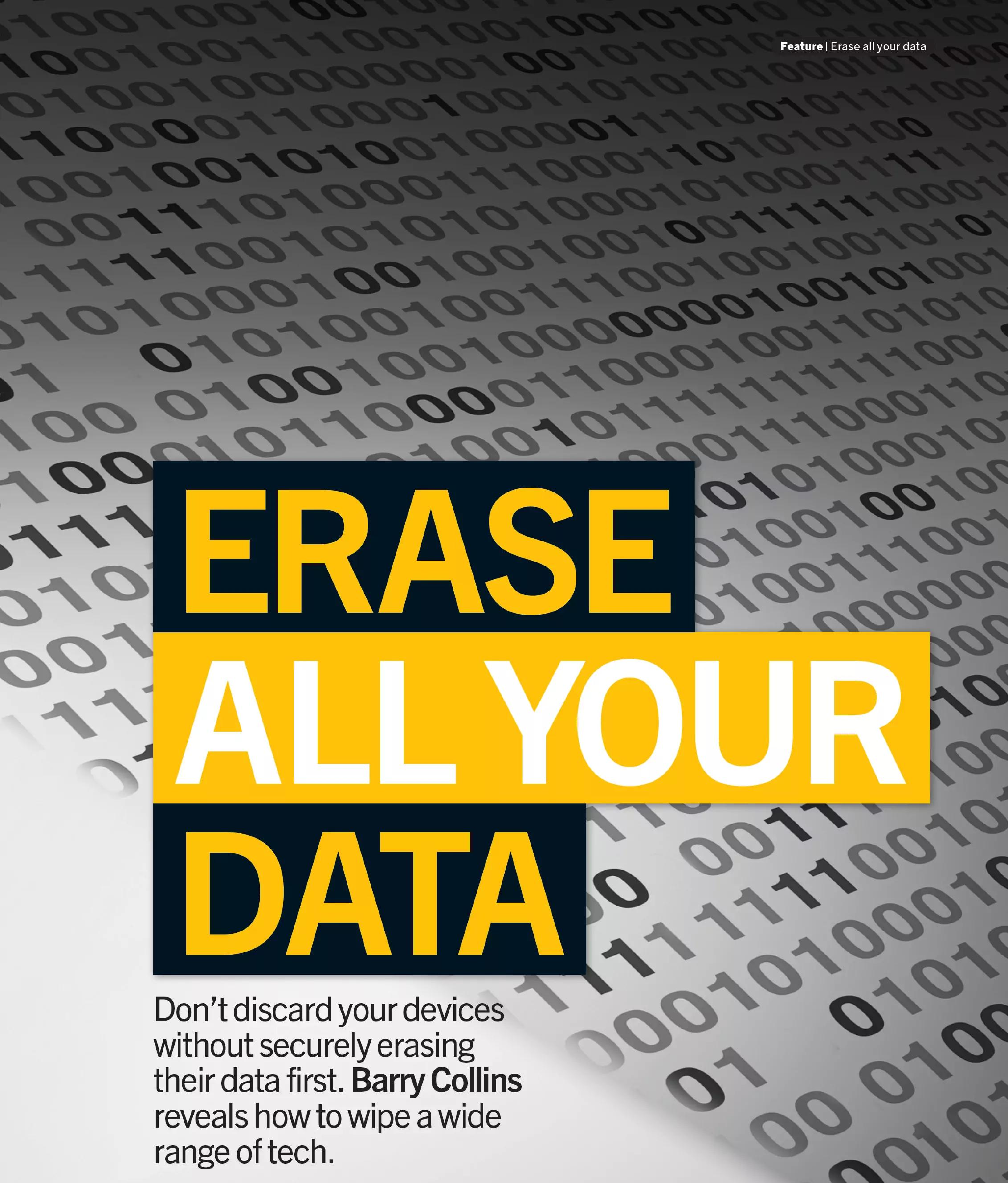


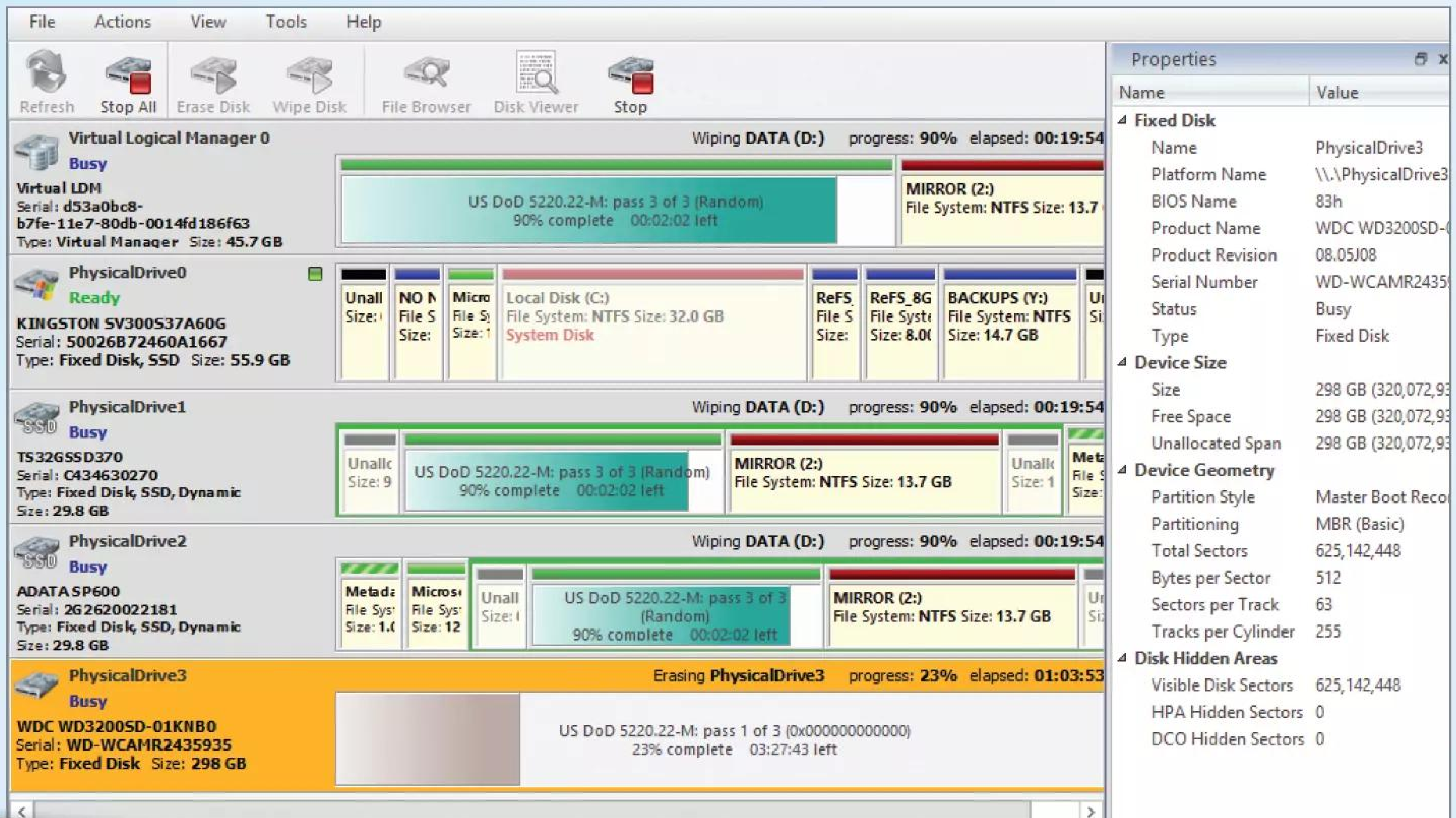
# ERASE ALL YOUR DATA

Don't discard your devices without securely erasing their data first. **Barry Collins** reveals how to wipe a wide range of tech.

Given that Windows 10 is at the end of its supported life, many people will be preparing to retire a PC over the next few months. But before you pull the plug on that PC for the last time, you need to ensure you've erased any sensitive data – and that requires more effort than simply running through the Reset procedure.

Of course, it's not only Windows 10 PCs that are being decommissioned. So, here we're going to run through how to ensure all the devices we use regularly are properly wiped before we send them on to their next destination – whether that be a friend or relative, a buyer or even straight to the recycling centre. You can't be too careful, even with a device that's destined for the crusher.

# WINDOWS PCs



Virtual Logical Manager 0
Busy
Virtual LDM
Serial: d53a0bc8-b7fe-11e7-80db-0014fd186f63
Type: Virtual Manager Size: 45.7 GB
Wiping DATA (D:) progress: 90% elapsed: 00:19:54
US DoD 5220.22-M: pass 3 of 3 (Random)
90% complete 00:02:02 left
MIRROR (2:)
File System: NTFS Size: 13.7

PhysicalDrive0
Ready
KINGSTON SV300S37A60G
Serial: 50026B72460A1667
Type: Fixed Disk, SSD Size: 55.9 GB
Local Disk (C:)
File System: NTFS Size: 32.0 GB
System Disk
BACKUPS (Y:)
File System: NTFS
Size: 14.7 GB

PhysicalDrive1
Busy
TS32GSSD370
Serial: C434630270
Type: Fixed Disk, SSD, Dynamic
Size: 29.8 GB
Wiping DATA (D:) progress: 90% elapsed: 00:19:54
US DoD 5220.22-M: pass 3 of 3 (Random)
90% complete 00:02:02 left
MIRROR (2:)
File System: NTFS Size: 13.7 GB

PhysicalDrive2
Busy
ADATA SP600
Serial: 2G2620022181
Type: Fixed Disk, SSD, Dynamic
Size: 29.8 GB
Wiping DATA (D:) progress: 90% elapsed: 00:19:54
US DoD 5220.22-M: pass 3 of 3 (Random)
90% complete 00:02:02 left
MIRROR (2:)
File System: NTFS Size: 13.7 GB

PhysicalDrive3
Busy
WDC WD3200SD-01KNB0
Serial: WD-WCAMR2435935
Type: Fixed Disk Size: 298 GB
Erasing PhysicalDrive3 progress: 23% elapsed: 01:03:53
US DoD 5220.22-M: pass 1 of 3 (0x000000000000)
23% complete 03:27:43 left

Properties

| Name | Value |
|---|---|
| **Fixed Disk** | |
| Name | PhysicalDrive3 |
| Platform Name | \\.\PhysicalDrive3 |
| BIOS Name | 83h |
| Product Name | WDC WD3200SD- |
| Product Revision | 08.05J08 |
| Serial Number | WD-WCAMR2435 |
| Status | Busy |
| Type | Fixed Disk |
| **Device Size** | |
| Size | 298 GB (320,072,9 |
| Free Space | 298 GB (320,072,9 |
| Unallocated Span | 298 GB (320,072,9 |
| **Device Geometry** | |
| Partition Style | Master Boot Reco |
| Partitioning | MBR (Basic) |
| Total Sectors | 625,142,448 |
| Bytes per Sector | 512 |
| Sectors per Track | 63 |
| Tracks per Cylinder | 255 |
| **Disk Hidden Areas** | |
| Visible Disk Sectors | 625,142,448 |
| HPA Hidden Sectors | 0 |
| DCO Hidden Sectors | 0 |

Active@ KillDisk
ERASE CERTIFICATE

ABOVE KillDisk is a great third-party utility that comes recommended by *APC*'s Lee Grant.

If you're disposing of a Windows 10/11 PC, you'll certainly want to clear off all your personal files first. And you might well be tempted by the Reset PC facility, which offers you the option to "remove everything" including "all of your personal files, apps and settings".

However, only when you delve into the Microsoft support pages for the Reset PC feature (**tinyurl.com/APC552reset**) does a rather ominous warning appear: "The data erasure functionality is targeted at consumers and does not meet government and industry data erasure standards," it warns.

Even more unhelpfully, it doesn't explain precisely what it does when "removing everything". Does it just delete the files? Does it write over them? We're really none the wiser. That is until you click two screens further through the Reset PC wizard and select the Change Settings link. Now you'll find an option to Clean Data, which reveals the default is to simply remove your files.

Microsoft still doesn't really explain what Clean Data actually does, but the help page recommends that you use this option if you're "planning to donate, recycle, or sell your PC".

"This might take some time," it adds, "but it makes it harder for other people to recover files you've removed."

Again, not particularly revealing. Certainly less helpful than this video from IT professional Jason Bagnell (**tinyurl.com/APC552youtube**), which shows him resetting a PC with the "Clean Data" option ticked and then trying to recover files from that PC using the well-known Recuva utility. It can't find anything other than Windows operating system files. For good measure, he uses a Hex editor to examine the raw data on the drive and discovers it was written over with random data.

So, it seems Windows does a reasonably good job of overwriting personal data, but if you want to be sure, it's time to reach for third-party utilities. Our PC repair guru, Lee Grant, has been a long-term user of KillDisk (**killdisk.com**) when he's nuking customers' hard disks and SSDs.

KillDisk does have a free version, but if you want it to overwrite the contents of a drive with anything more than a single pass of zeros, you'll need to pay US$49.95 for the personal licence or US$69.95 if you're using it for business. This unlocks – among other features – a variety of erasure standards, including the British HMG ISS Enhanced, which makes three passes to ensure no trace of data is left behind. The software also lets you print a label to attach to the drive, and a certificate to give to a new owner, to show that the drive has been fully erased and to which standard.

You can't erase your system boot disk from the Windows application. Instead, you'll need to use the software to create a bootable USB drive with a portable version of the software on. This will wipe out the Windows installation too, so if you're planning on reselling the PC or giving it to someone else, you might want to prepare a second USB drive to install Windows 10/11 from.

When it comes to wiping the drive, you're going to need to boot into the KillDisk USB, so make sure you know which key gets you into the UEFI boot menu for your PC (a Google should suffice). Then, once the wipe is complete, you can reinstall Windows from your second USB stick.

If you own external SSDs for backing up your data that you want to securely wipe, it's also worth checking out the utilities provided by the manufacturers. Seagate's SeaTools 5 (**tinyurl.com/APC552seagate**) includes various options to wipe the drive, including "overwrite sanitize". This option allows you to pick from various algorithms that overwrite the data to different government standards.

Samsung's Magician app (**tinyurl.com/APC552magician**) offers a similar facility, using a firmware command to regenerate the internal encryption key, rendering any data previously stored on the drive unreadable.

Talking of which, if your Windows machine had BitLocker encryption turned on in the first place, it seems your best bet is to create a Windows recovery media USB drive, boot from that and use the Advanced Setup option to delete the partition protected by BitLocker. Then create a new partition and install the OS into that. Even if some of the old BitLocker data isn't written over, it's fully encrypted, so there's no danger of it spilling any important secrets.

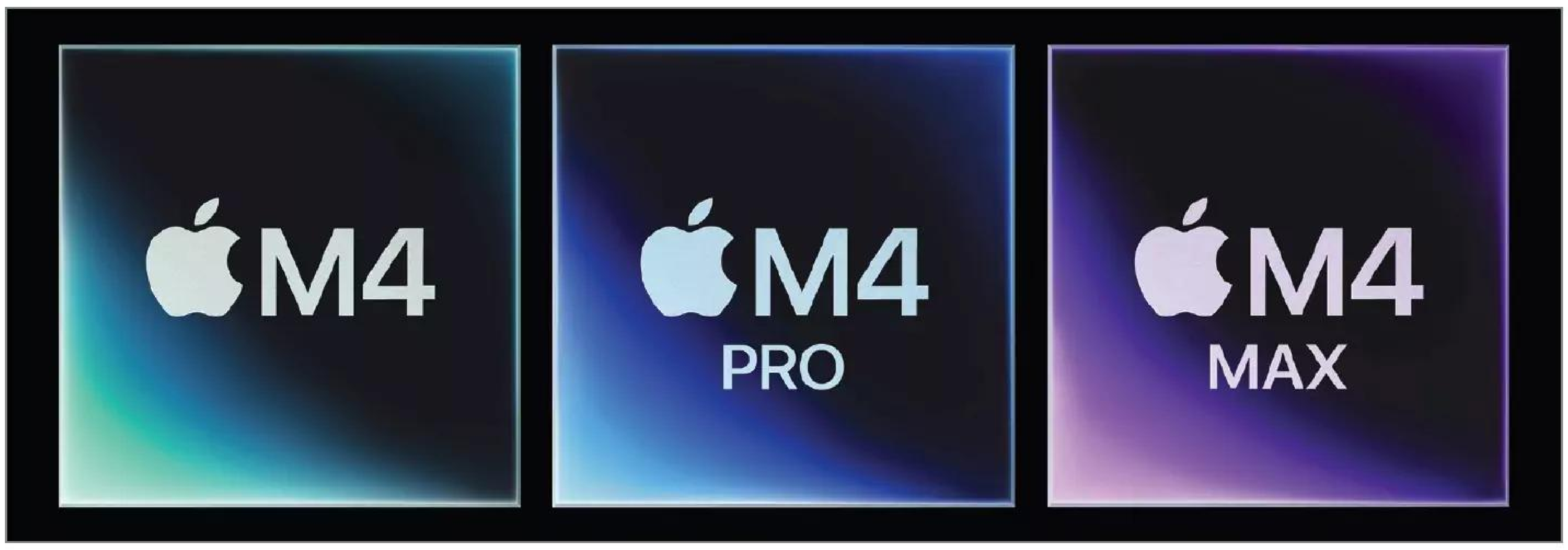
RIGHT You can use a USB drive to delete a BitLocker-protected partition.

# APPLE MACS

Securely wiping a Mac is much easier than it is with Windows provided you own a relatively recent machine. All Apple Silicon-based Macs have the FileVault encryption switched on by default. Even Intel-based Macs with a T2 security chip have FileVault, although it wasn't switched on by default on these machines.

If you do have a FileVault-enabled machine, securely wiping your machine is simply a case of going to Settings | General | Transfer or Reset | Erase All Content and Settings. This wipes out the encryption keys, which means nothing is recoverable.

This is because, on modern Macs, Apple creates two disk volumes: a System volume that contains the operating system and a Data volume that contains all the user files. The Erase All Content and Settings function basically wipes out that Data volume and creates a new one with fresh encryption keys, ensuring the system is effectively restored to factory settings. It doesn't take long, either.



**ABOVE** All Apple Silicon-based Macs have the FileVault encryption enabled by default.

**RIGHT** Modern Macs have two disk volumes.

If you have an older Mac that doesn't have FileVault encryption turned on, the process is more laboured. First you must sign out of all Apple services on the Mac: iTunes, iCloud and iMessage. You then have to restart the Mac and boot into macOS Recovery by holding down the power button. From there you should be able to access the Erase feature from within Disk Utility. This will wipe the operating system, so you'll then need to boot back into Recovery and reinstall macOS from the menu screen. It's not clear how secure the Erase facility in Disk Utility is, so to be sure you might want to log in to the freshly re-installed operating system and use something like KillDisk to write over the unused space again, just to be doubly sure. KillDisk can also be used to deal with any external drives you had attached to the Mac.

# CHROMEBOOKS

Chromebooks don't normally store a wealth of personal files, but data that you won't want falling into the wrong hands –such as browsing history and passwords – are stored on the device.

The good news is all data on a Chromebook is encrypted by default, with each user having their own encrypted store. That means when you enact the option to reset or "powerwash" the Chromebook, the user accounts are deleted and that severs the link to the encrypted content. Although it's still residing on the disk, it shouldn't be accessible in any practical sense.

**ABOVE** You can reinstall ChromeOS from a USB drive if you want to pass on your Chromebook.

If you want to be doubly sure, you can manually overwrite data in Developer Mode, but bear in mind that this will wipe out everything, including the operating system. To enter Developer Mode (which in itself powerwashes the device), hold Escape+Refresh+Power, then press Ctrl+D when prompted. After going through a few confirmation stages, you should be able to open a terminal by pressing Ctrl+Alt+T. Then type "shell" to get access to the full Linux shell.

Use the command "lsblk" to confirm the disk name, then type:

```
sudo shred -v -n 3 /dev/mmcblk0
```

This overwrites the disk with random data three times. If your disk isn't called "mmcblk0", replace that with the correct name.

You'll need to reinstall ChromeOS from a USB drive using the Chromebook Recovery Utility extension in Chrome if you want a working Chromebook to pass on or sell.

Professional
CompactFlash
233x Speed
SanDisk
Extreme IV
CompactFlash
45MB/s
8G
SanDisk
CompactFlash

# MEMORY CARDS

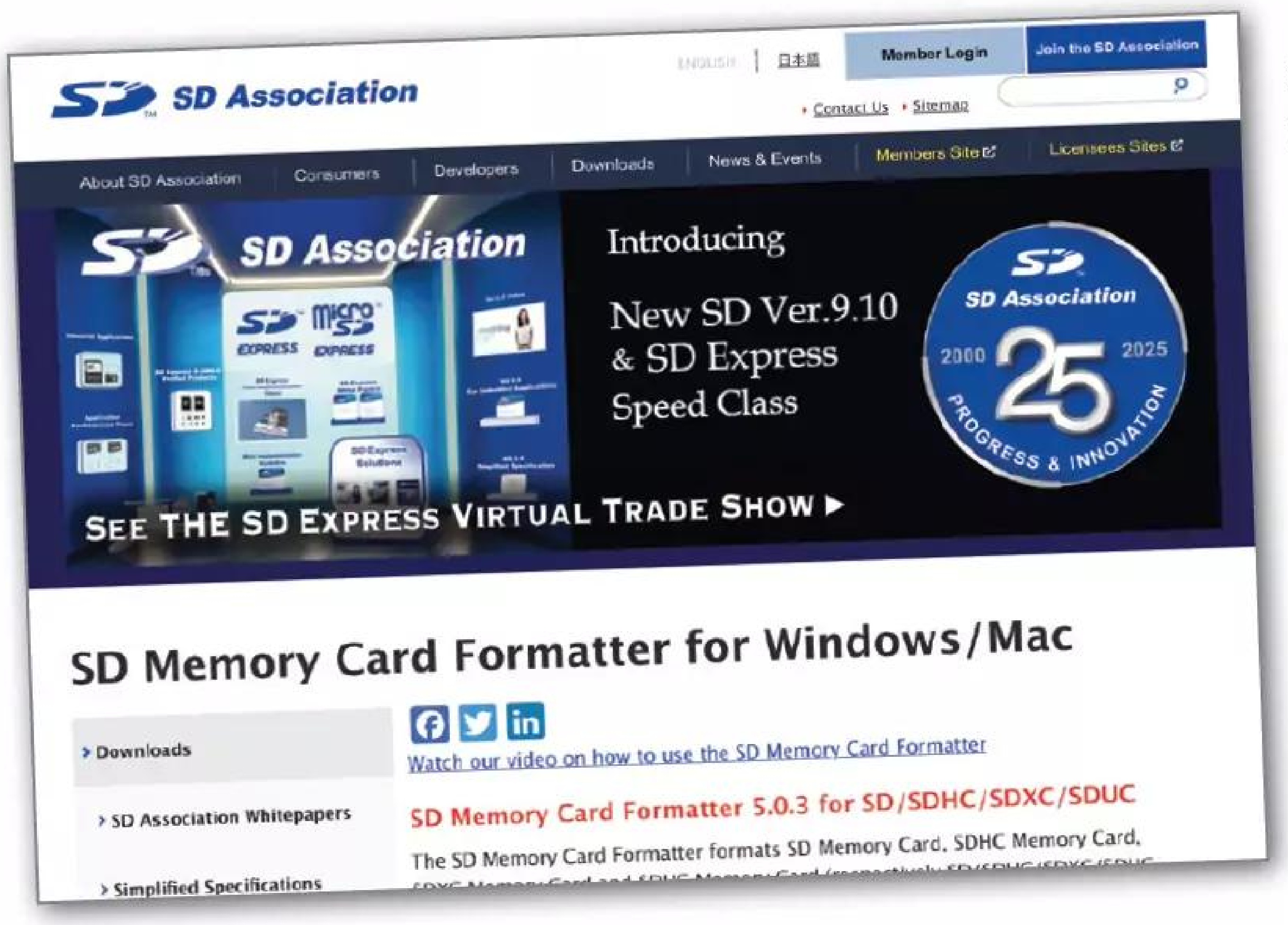
Memory cards are highly likely to contain photos or videos that you don't want others to see. They might also contain sensitive data, for example if you've used one to boot a Raspberry Pi.

While it's a doddle to destroy a memory card – we've destroyed dozens without even trying – it's more environmentally friendly to wipe them clean and pass them on. Even if you are intent on destroying the card, wiping it first will make sure nothing is retrievable from the fragments.

The good news is utilities such as KillDisk (mentioned in the Windows and Mac sections on the previous pages) will treat SD cards just like any other drive, so you can use that to write over the card's memory and ensure nothing is retrievable.

That said, when we used KillDisk to erase an SD card, it needed to be reinitialised the next time we put the card in a computer. That's not ideal, as it may lead less tech-savvy users to discard it as defunct. Step forward the SD Association, which offers a free formatter for Windows and Mac (**tinyurl.com/APC552sdcard**). It claims that regular formatting tools "may not be optimised for SD/SDHC/SDXC/SDUC cards and it may result in lower performance".

The formatter includes an option to "overwrite the user data area completely", according to the utility's FAQ page, although it doesn't say how many times, presumably once. However, that should be enough for all but the most sensitive of data.


SD Association
ENGLISH | 日本語
Member Login
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Developers
Downloads
News & Events
Members Site
Licensees Sites
SD Association
Introducing
New SD Ver.9.10 & SD Express Speed Class
SD Association 2000 25 2025 PROGRESS & INNOVATION
SEE THE SD EXPRESS VIRTUAL TRADE SHOW ▶
Downloads
SD Association Whitepapers
Simplified Specifications

SD Memory Card Formatter for Windows/Mac

Watch our video on how to use the SD Memory Card Formatter

SD Memory Card Formatter 5.0.3 for SD/SDHC/SDXC/SDUC

The SD Memory Card Formatter formats SD Memory Card, SDHC Memory Card,

**LEFT** The SD Association provides a free formatter.

# iPADS & iPHONES

The good news when it comes to iPads and iPhones is that they're protected in precisely the same fashion as modern-day Macs. The system volume containing the operating system and the user data volume are kept apart, and when you choose the option to erase all data on the device, it burns the encryption keys and resets the user volume. This means there's no practical way for the next person who gets their hands on your device to get their hands on your data.

To wipe an iPad or iPhone, open the Settings app, select General | Transfer or Reset iPad/iPhone and select Erase All Content and Settings to go through the process.

09:41
Clock
Camera
375/500KCAL
19/30MIN
4/12HRS
TV
Stocks
Fitness
FRIENDS
Photos
Mail
Files
App Store
Weather
Health
Home
ENERGY (Deluxe)
Disclosure
News
Photos
Music

**RIGHT** It's easy to wipe an iPhone or an iPad.

# MORE DEVICES THAT ARE WORTH A WIPE

If you're passing on any of the following devices, returning them to the vendor or even just sending them for recycling, it's well worth performing a factory reset first. If you're passing them on, it might prevent the recipient running into setup problems. If not, you've done the best you can to ensure that no sensitive data leaks.

## WI-FI ROUTERS

It's become almost standard for ISPs to demand routers back from you if you switch provider. These obviously store details such as SSIDs and passwords, and although you'd be ill-advised to reuse these for a new router, many people do out of sheer convenience. Most routers have a factory reset option that allow you to clear the device's memory. Some even have a physical reset button on the back, which you can use to clear the settings.

## SMART SPEAKERS

Although smart speakers store very little on the device and shouldn't be able to go online if they're not connected to your home network, it's worth logging out of such devices before you pass them on — especially if you're expecting them to be reused. For Amazon Echo devices, you can do this by opening the Alexa app, choosing Settings | Device Settings then selecting the relevant device. Now hit the settings cog for that device in the top-right corner and scroll down to the bottom of the page, where you can deregister the device from your account.

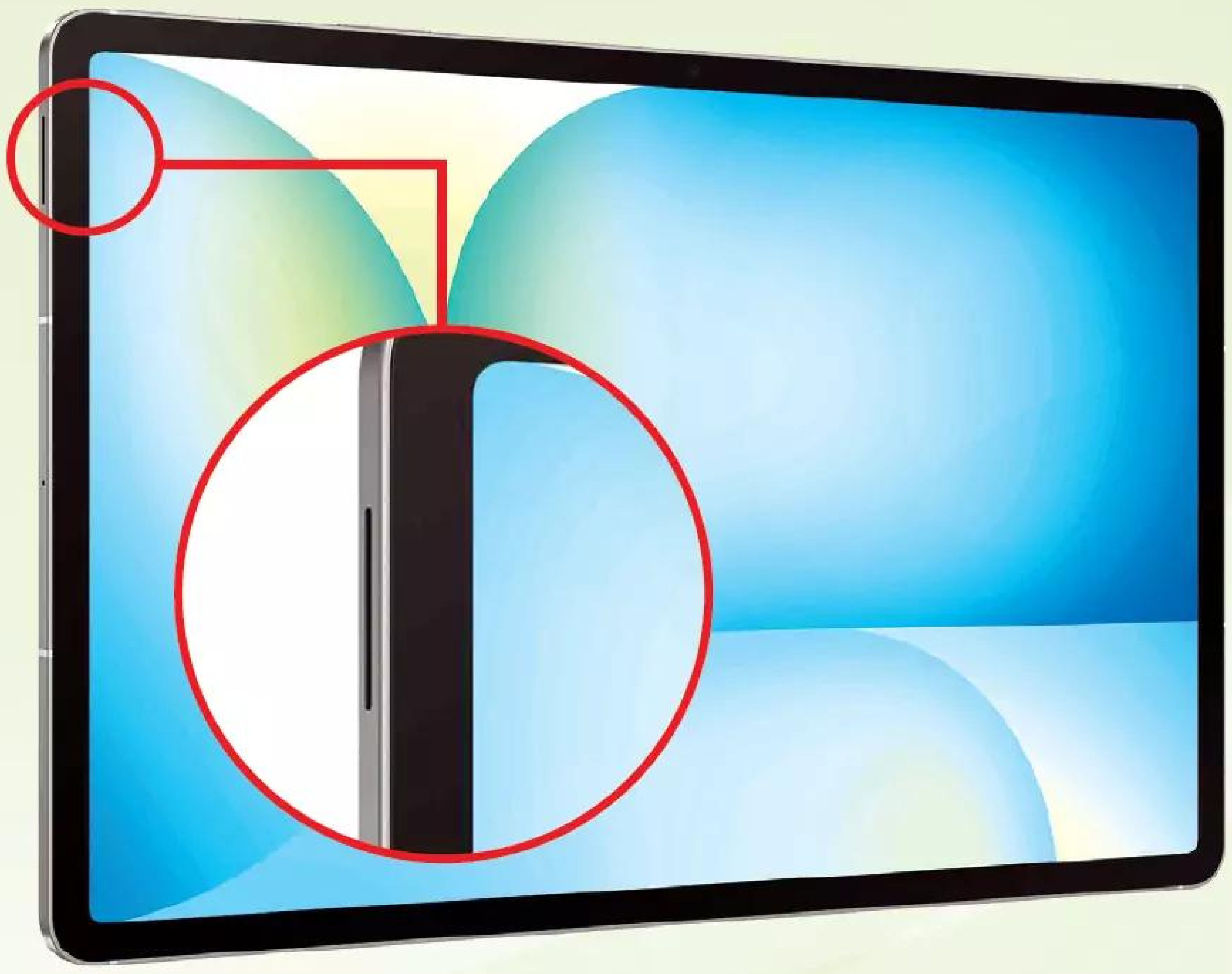
# ANDROID DEVICES

Modern Android phones and tablets are very similar to iPads/iPhones in that they have encryption turned on by default. If you follow the procedures to factory-reset your device (these vary slightly from handset to handset), there shouldn't be any practical way for a new owner to retrieve your data. This encryption system has been in place since Android 10, released back in 2019, so very few devices in circulation today won't be protected.

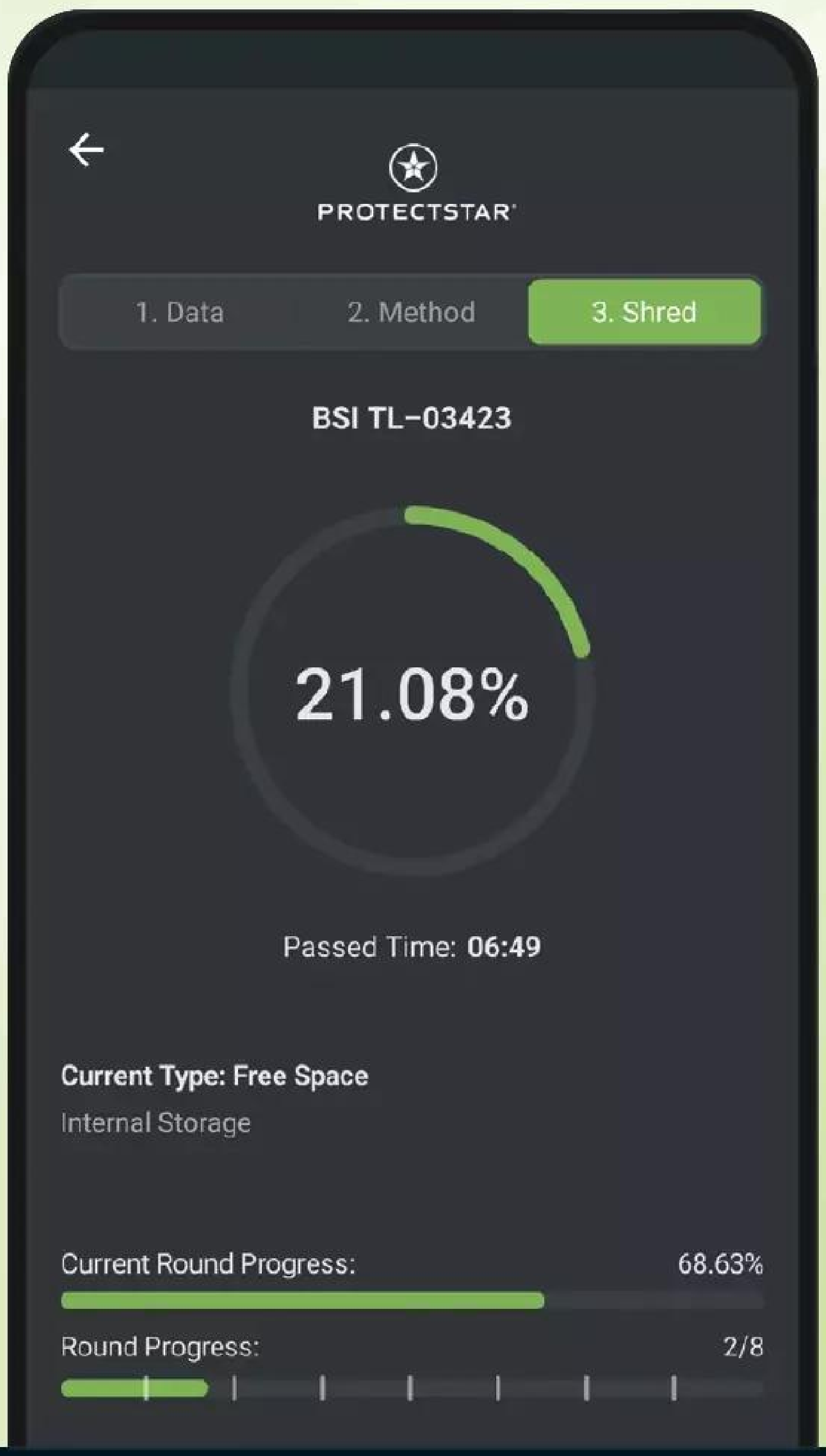
That said, there are a couple of extra considerations for Android handsets. Unlike Apple devices, some Android phones/tablets allow you to pop in memory cards to supplement the built-in storage. You might want to ensure they're properly wiped by using the utilities mentioned in the memory cards section opposite.

If you want to be doubly, triply sure that the data on the phone's internal storage has been zonked, you can install the free iShredder app from the Play Store. This includes an option to overwrite any free space on the phone with junk data, although like KillDisk for Windows/Mac, you have to pay for the premium version if you want to access the "military-grade" options where it takes multiple passes. If you want to run this app, it's best to factory-reset the phone first, log in again (ignoring all options to restore apps/data from the cloud) and then install and run the iShredder app to fill the free space with junk data. You should then factory-reset the phone once more.

If you regularly handle sensitive data on your phone, it might be worth installing iShredder for day-to-day use. It can be used to erase and write over individual files, although again – if you want it to tackle specific folders or data from apps such as WhatsApp and Telegram – you'll have to upgrade to the premium version. That costs $2.49 per month, although there is a "lifetime" licence on offer for $65.99.



**ABOVE** Wipe any memory cards you've used to expand the storage.



PROTECTSTAR

1. Data | 2. Method | 3. Shred

BSI TL–03423

21.08%

Passed Time: 06:49

Current Type: Free Space
Internal Storage

Current Round Progress: 68.63%

Round Progress: 2/8

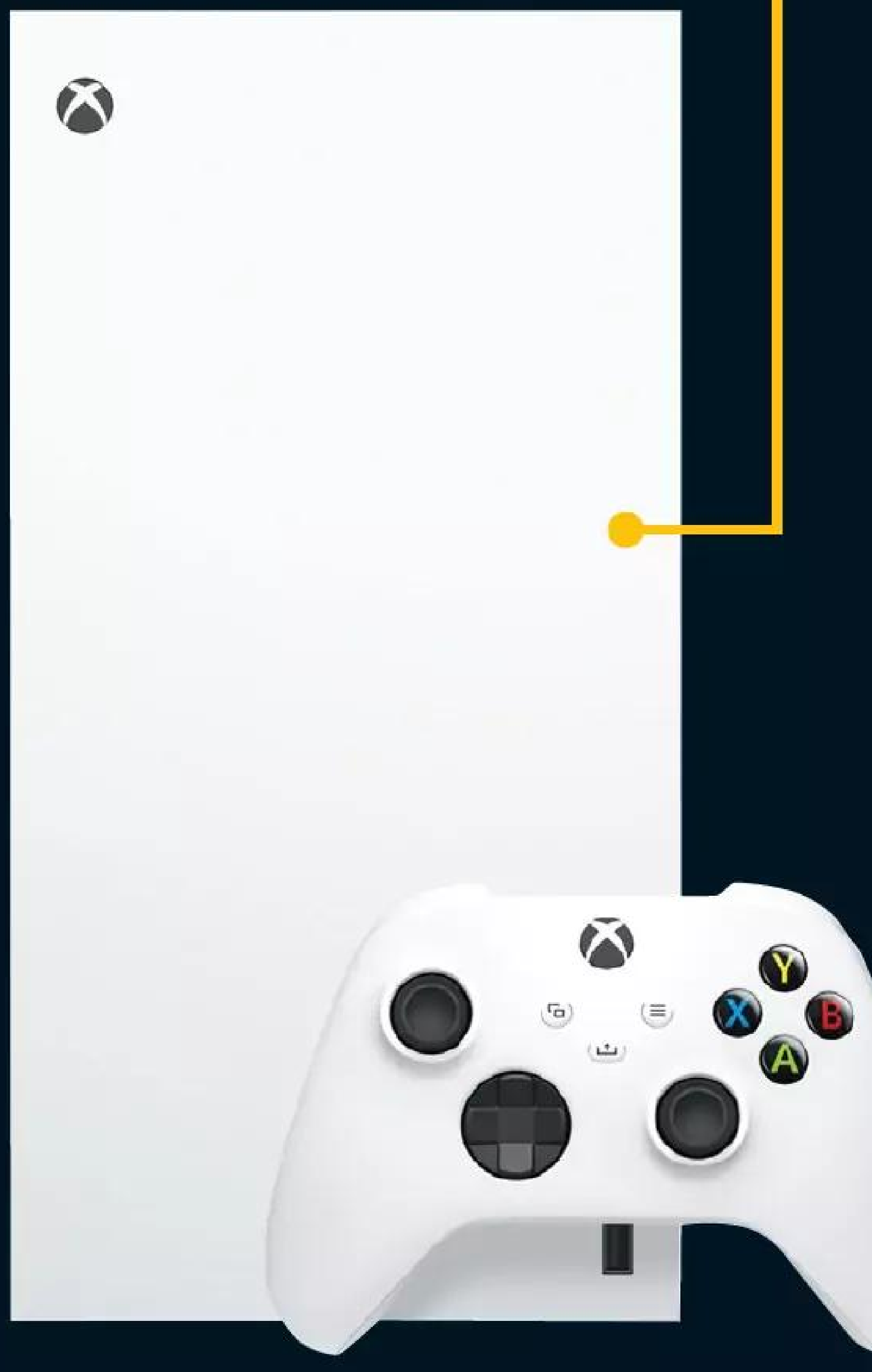
**RIGHT** iShredder is a free app that can overwrite data.

## PRINTERS

Again, printers will store Wi-Fi connection details to help them join your network. Although the risk of anyone hacking into a printer to retrieve such details is remote, you might as well flush them out before you dispose of the device by using the factory reset, not least because it might trigger the networking wizard for any new owner.

## GAMES CONSOLES

Games consoles encourage you to leave payment details stored in them to make it easier to purchase games, and they will often also store details for various accounts, such as Game Pass, Netflix and Spotify. Log out of accounts and factory-reset the console before you even think of passing it on or discarding it. ■



LG SMART TV | 2024

## SMART TVs

TVs are now a hive of personal data. How many times have you rented an Airbnb to find someone else's Netflix account or YouTube credentials stored in the TV, for example? A factory reset will avoid any chance of someone being able to hijack your accounts or even make purchases from details stored in the device.

# 6 best reader apps

**Pocket alternatives for the discerning reader.**

17:44

Top Picks

Predictions for 2050

Erik Hoel

**Futurists have their heads in the clouds**

The truth is that most futurists are attracted to speculating about the future for the same reason as science fiction writers: they like ge…

Staff Pick

Noa
Why
Why
It's bee
Google
"why dic
better qu

## Group test

Reviewed by
**ALEX BLAKE**

**ON TEST…**
- > GoodLinks
- > Instapaper
- > Matter
- > Raindrop.io
- > Readwise Reader
- > Safari Reading List

› Image credits: Apple Inc., [illegible] Inc.

**Sometimes, you don't have time to read that fascinating article you chanced upon on your phone, but you also don't want to lose it to the ether, never to come across it again. In cases like that, a great read-it-later app can be a godsend, saving your articles in a readable format – with ads and distractions filtered out – ready for when you have more time to read.**

Pocket used to be the go-to app for this purpose, but unfortunately it was recently shut down by developer Mozilla. If you're a diehard Pocket fan – or just want a read-it-later app for your content consumption needs – there's a new void in your app arsenal that needs filling.

Fortunately, you're not without options. Here, we've pitted six of the best read-it-later apps against each other to see which is the true heir to Pocket's crown. From beautiful reading experiences to pro-level customisations that power users will love, there are plenty to choose from. Let's see which deserve the highlighter's touch and which will be banished to the archive.

## How we tested

We spent a few weeks saving articles from around the web into these apps, assessing the reader view, and testing out each app's built-in features and customisation options. Where possible, we also imported a list of thousands of saved articles from Pocket to see how existing tags, highlights and favourites were handled. As well as that, each app's customisation features were put under the microscope, as were their overall app experiences.

› Image credit: Apple Inc, Ev Wallis Inc

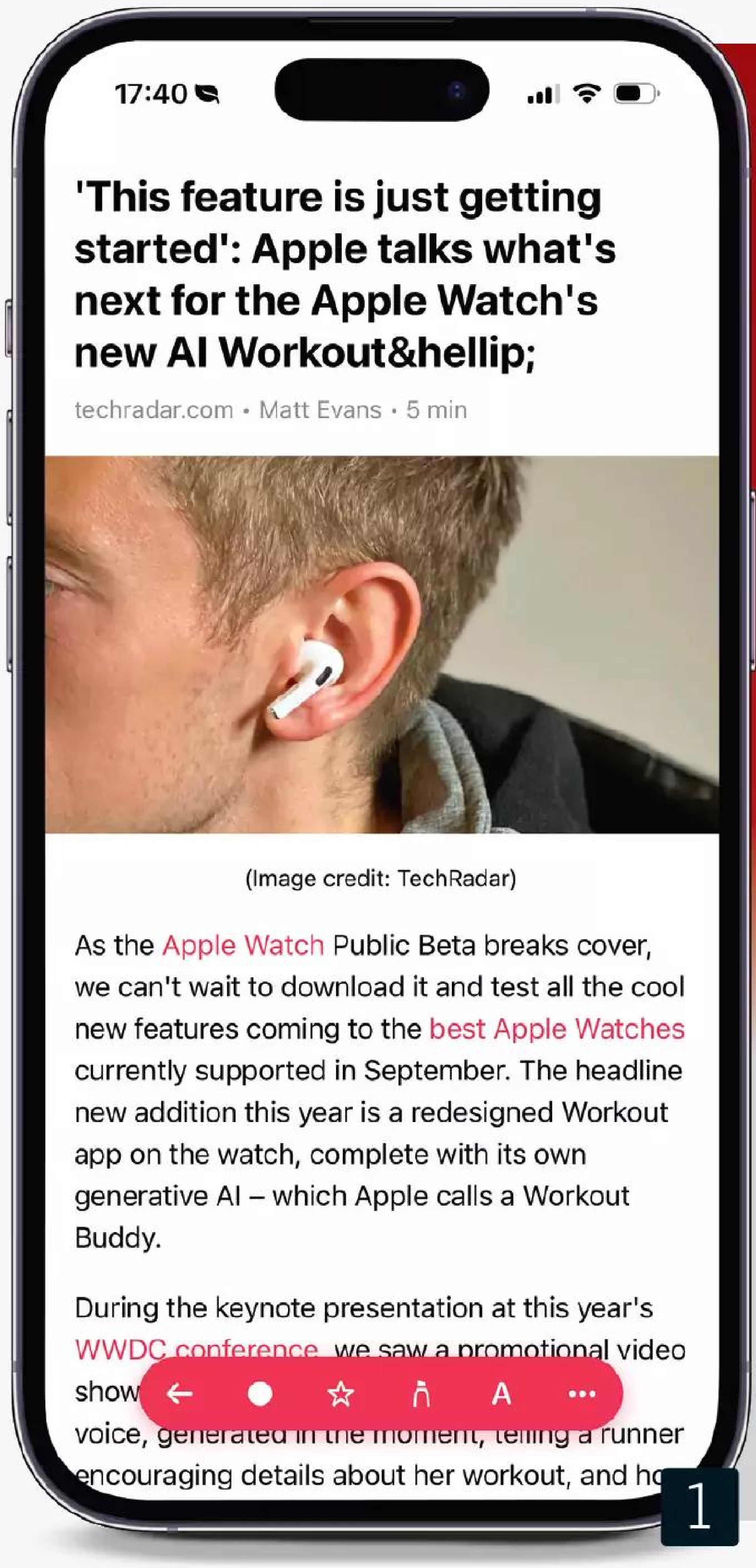
## Things to consider…

**1** **Article discovery**
Pocket had a dedicated section where it would curate and suggest articles you might want to save. If you love that kind of feature, your choices are limited.

**2** **Make it yours**
Don't like an app's default swipe gestures? Want to read your articles in a different font? Check if your chosen app lets you change its look and feel.

**3** **More than just reading**
Some apps can save Really Simple Syndication (RSS) feeds, PDFs videos, and more in addition to regular articles, while others can transcribe podcasts or read saved pages aloud.

**4** **Paying the price**
Pocket was entirely free, but that's a rarity here; only Safari Reading List doesn't charge for use. GoodLinks is a pay-once affair, but all the other options require a subscription.


1

17:40

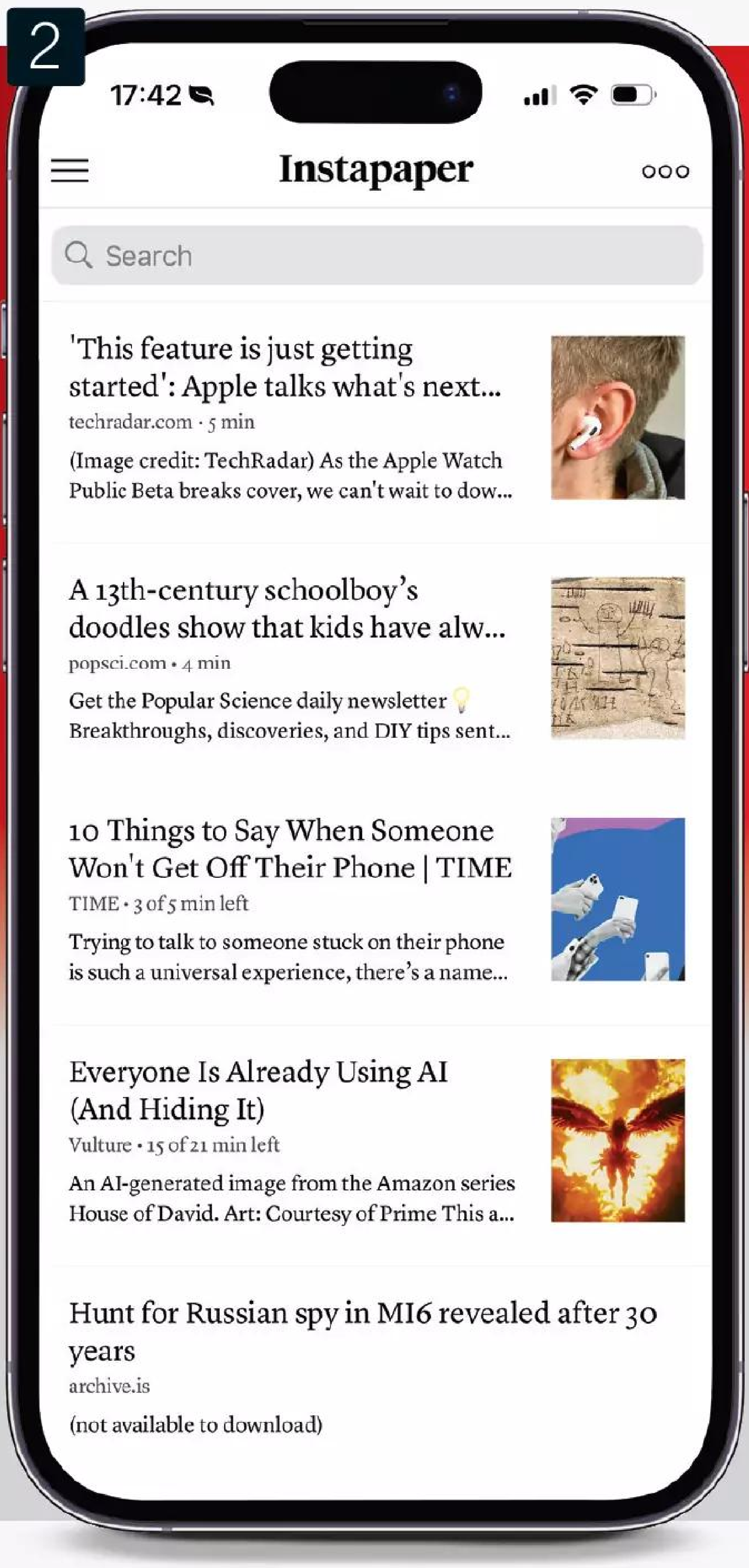
'This feature is just getting started': Apple talks what's next for the Apple Watch's new AI Workout&hellip;

techradar.com • Matt Evans • 5 min

(Image credit: TechRadar)

As the Apple Watch Public Beta breaks cover, we can't wait to download it and test all the cool new features coming to the best Apple Watches currently supported in September. The headline new addition this year is a redesigned Workout app on the watch, complete with its own generative AI – which Apple calls a Workout Buddy.

During the keynote presentation at this year's WWDC conference, we saw a promotional video show
voice, generated in the moment, telling a runner
encouraging details about her workout, and ho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17:42

Instapaper

Search

'This feature is just getting started': Apple talks what's next…
techradar.com • 5 min
(Image credit: TechRadar) As the Apple Watch Public Beta breaks cover, we can't wait to dow…

A 13th-century schoolboy's doodles show that kids have alw…
popsci.com • 4 min
Get the Popular Science daily newsletter💡 Breakthroughs, discoveries, and DIY tips sent…

10 Things to Say When Someone Won't Get Off Their Phone | TIME
TIME • 3 of 5 min left
Trying to talk to someone stuck on their phone is such a universal experience, there's a name…

Everyone Is Already Using AI (And Hiding It)
Vulture • 15 of 21 min left
An AI-generated image from the Amazon series House of David. Art: Courtesy of Prime This a…

Hunt for Russian spy in MI6 revealed after 30 years
archive.is
(not available to download)

# GoodLinks

$9.99 **FROM** goodlinks.app FOR iOS

**1** GoodLinks feels like it's built from the ground up for power users. It comes with by far the largest selection of Shortcuts integrations (28), while there's a similarly huge range of available app customisations (like swipe gestures and link opening behaviour). You're spoiled for choice when it comes to Home page widgets, and its up-front price tag means there's no subscription. And that's not forgetting its beautiful reader view and overall app design.

It's not perfect, though. GoodLinks lacks an article discovery feature and there's no way to archive posts – you can remove them, but they're permanently deleted after 30 days. It also goes without some great touches you'll find elsewhere, like Readwise Reader's clever artificial intelligence (AI), Matter's podcasts integration, and Instapaper's helper for speed readers. Still, GoodLinks is a brilliant option if you love doing things your own way, especially if that involves building bespoke shortcuts.

### VERDICT

**Hugely customisable with powerful integrations, though it's missing some nice-to-haves.**

★★★★☆

# Instapaper

Free (IAPs) **FROM** instapaper.com FOR iOS, Android, Kindle, Kobo

**2** Instapaper does a great job of cutting out distractions like 'read more' sections from saved pages, making it a strong choice if you want a clean reading experience. It's also stuffed with interesting extras, like AI summaries that pull out key highlights and a Speed Read feature that flashes the words on-screen to help you read faster. It's got 14 shortcuts (the second best on test), and you get lots of control over how the app works, from haptic feedback to pagination options.

If you'd rather listen to articles, it can read them aloud for you, even offering to create playlists of your saves to line them up one after another. Unfortunately, its AI voice is very robotic and far less natural-sounding than Matter's.

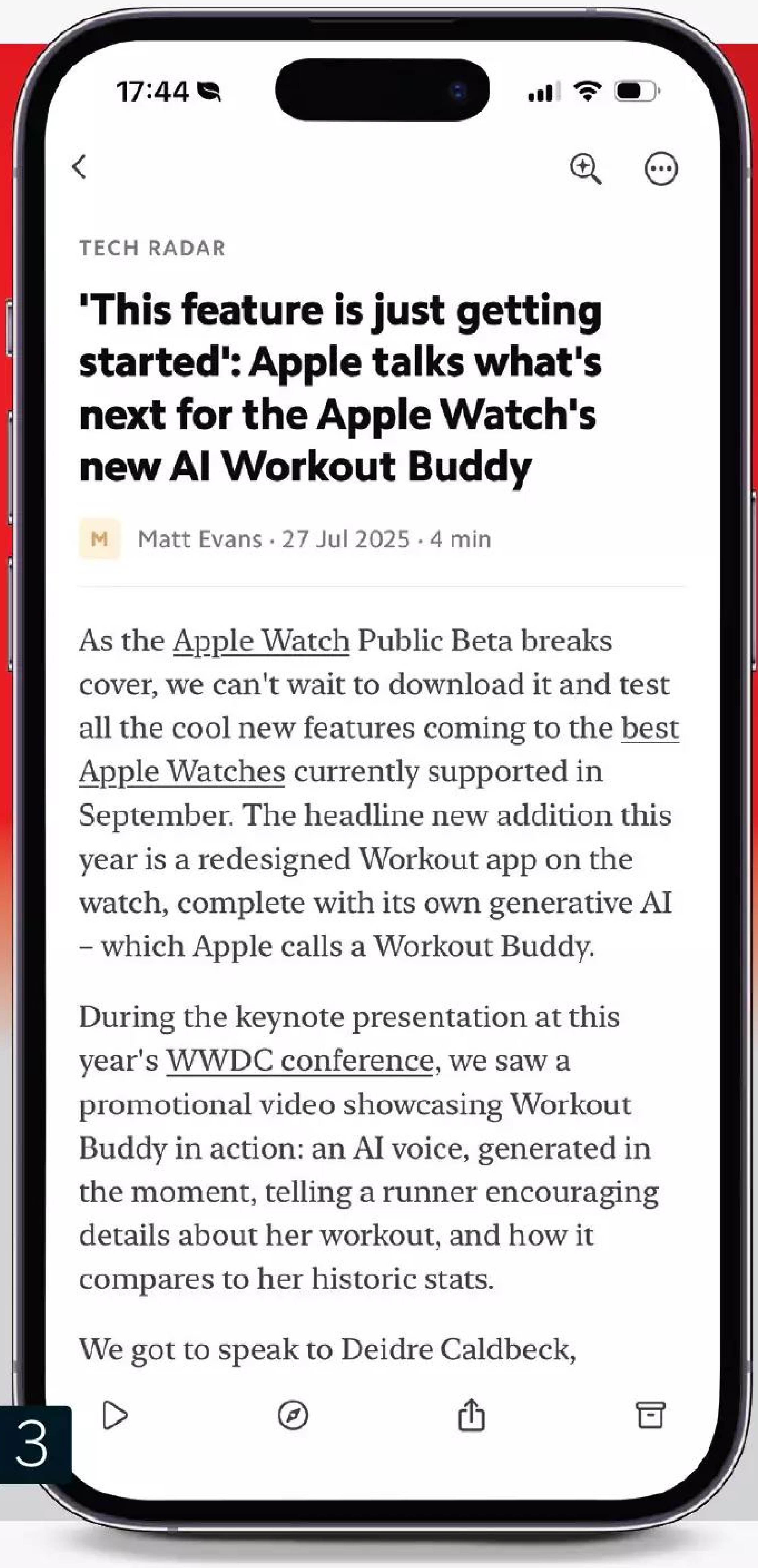
Instapaper also lacks Home page widgets, article discovery, and some of the other clever features you'll find elsewhere. Despite that, minimalists should feel right at home with its distraction-busting, pared-back design.

### VERDICT

**Cuts distracting elements and is highly customisable. The robotic AI voice is annoying though.**

★★★★☆

Image credits: Apple Inc, Ngoc Luu, Instant Paper Inc, Recurrent, Time USA LLC, Vox Media LLC, archive.org



3

17:44

TECH RADAR

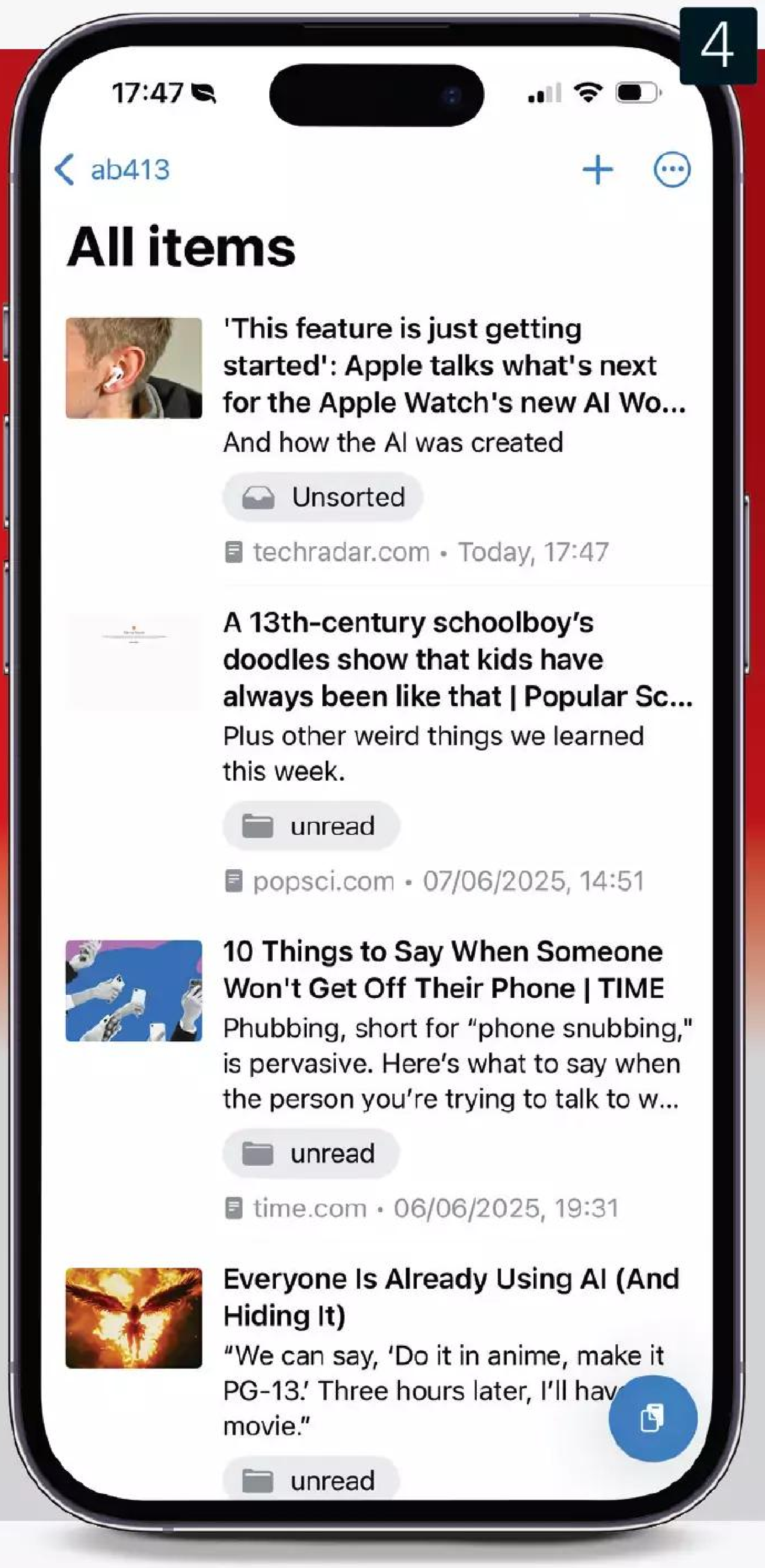
**'This feature is just getting started': Apple talks what's next for the Apple Watch's new AI Workout Buddy**

M Matt Evans · 27 Jul 2025 · 4 min

As the Apple Watch Public Beta breaks cover, we can't wait to download it and test all the cool new features coming to the best Apple Watches currently supported in September. The headline new addition this year is a redesigned Workout app on the watch, complete with its own generative AI – which Apple calls a Workout Buddy.

During the keynote presentation at this year's WWDC conference, we saw a promotional video showcasing Workout Buddy in action: an AI voice, generated in the moment, telling a runner encouraging details about her workout, and how it compares to her historic stats.

We got to speak to Deidre Caldbeck,



4

17:47

ab413

**All items**

'This feature is just getting started': Apple talks what's next for the Apple Watch's new AI Wo...
And how the AI was created
Unsorted
techradar.com • Today, 17:47

A 13th-century schoolboy's doodles show that kids have always been like that | Popular Sc...
Plus other weird things we learned this week.
unread
popsci.com • 07/06/2025, 14:51

10 Things to Say When Someone Won't Get Off Their Phone | TIME
Phubbing, short for "phone snubbing," is pervasive. Here's what to say when the person you're trying to talk to w...
unread
time.com • 06/06/2025, 19:31

Everyone Is Already Using AI (And Hiding It)
"We can say, 'Do it in anime, make it PG-13.' Three hours later, I'll hav movie."
unread

# Matter

Free (IAPs) **FROM** hq.getmatter.com **FOR** iOS, browser

**3** If you want an app that hews closely to the Pocket experience, Matter might be your best bet. It's the only app here to offer a true article discovery feed, helping you find new reading material without manually scouring the web. It doesn't look as flashy as Readwise Reader but can match it for features.

Everything feels tailor-made for devoted readers. Tap a paragraph and you'll see a list of relevant questions you can ask Matter's AI; press and hold the paragraph and it's highlighted automatically for you. With Readable Podcasts, Matter transcribes your favourite episodes so you can read as you listen – double-tap your AirPods to highlight a paragraph as it's spoken. Matter also reads articles in a natural voice, allowing you to listen without any jarring robo-speech.

Its design and single widget look a little basic, but the fact remains that Matter is one of the best choices if you have a Pocket-shaped hole in your life.

## VERDICT

**Excellent features plus curated article discovery. Plain design and few shortcuts & widgets.**

★★★★★

# Raindrop.io

Free (IAPs) **FROM** raindrop.io **FOR** iOS, Android, Linux, browser

**4** Found yourself a bit overwhelmed by AI assistants and podcast transcription? If so, Raindrop.io might be right up your street. It's a much more minimalistic option than many choices here, but still offers all the key features you need in a read-it-later app. That means you get highlights, tags, notes and favourites, an archive to stash articles you've read, cross-device syncing, plenty of room for app and reader customisation, and a clean reader view that's one of the most pleasant to use out of all the apps we tested.

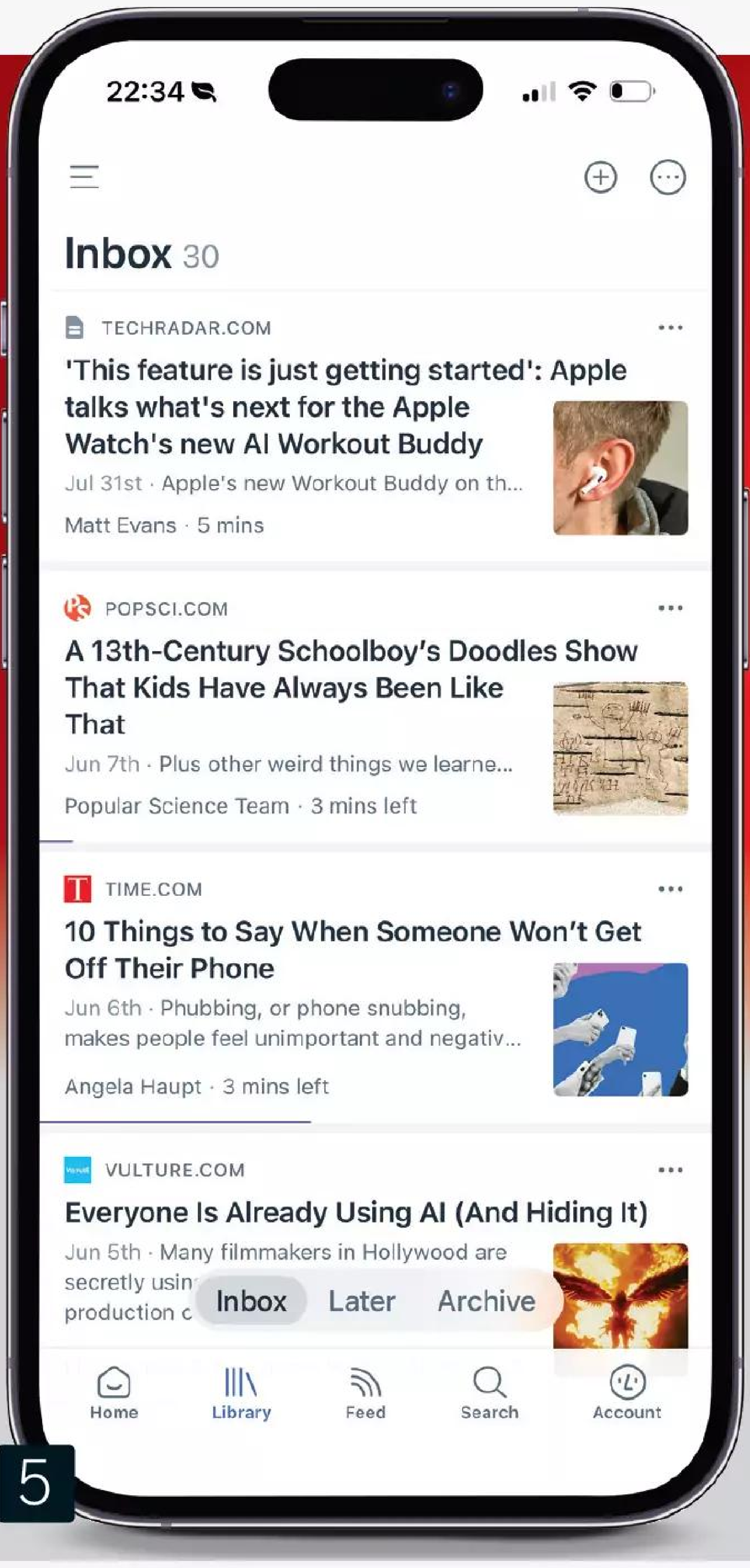
An affordable premium plan (the cheapest here at $4.99/month) sends you custom alerts to remind you about your saves, features automatic backups and online storage space, and can find broken links, duplicate articles, and more. That's enough to get you going, and it will be plenty for many. But Raindrop.io's focus on simplicity and its relative scarcity of pro-level features might not do the trick for demanding power users.

## VERDICT

**Simple, streamlined app that's very affordable. But no widgets or shortcuts and lacks power user features.**

★★★☆☆

Image credits: Apple Inc, Dig Wells Inc, SP Rustem Mussabekov, Recurrent, Time USA LLC,Vox Media LLC



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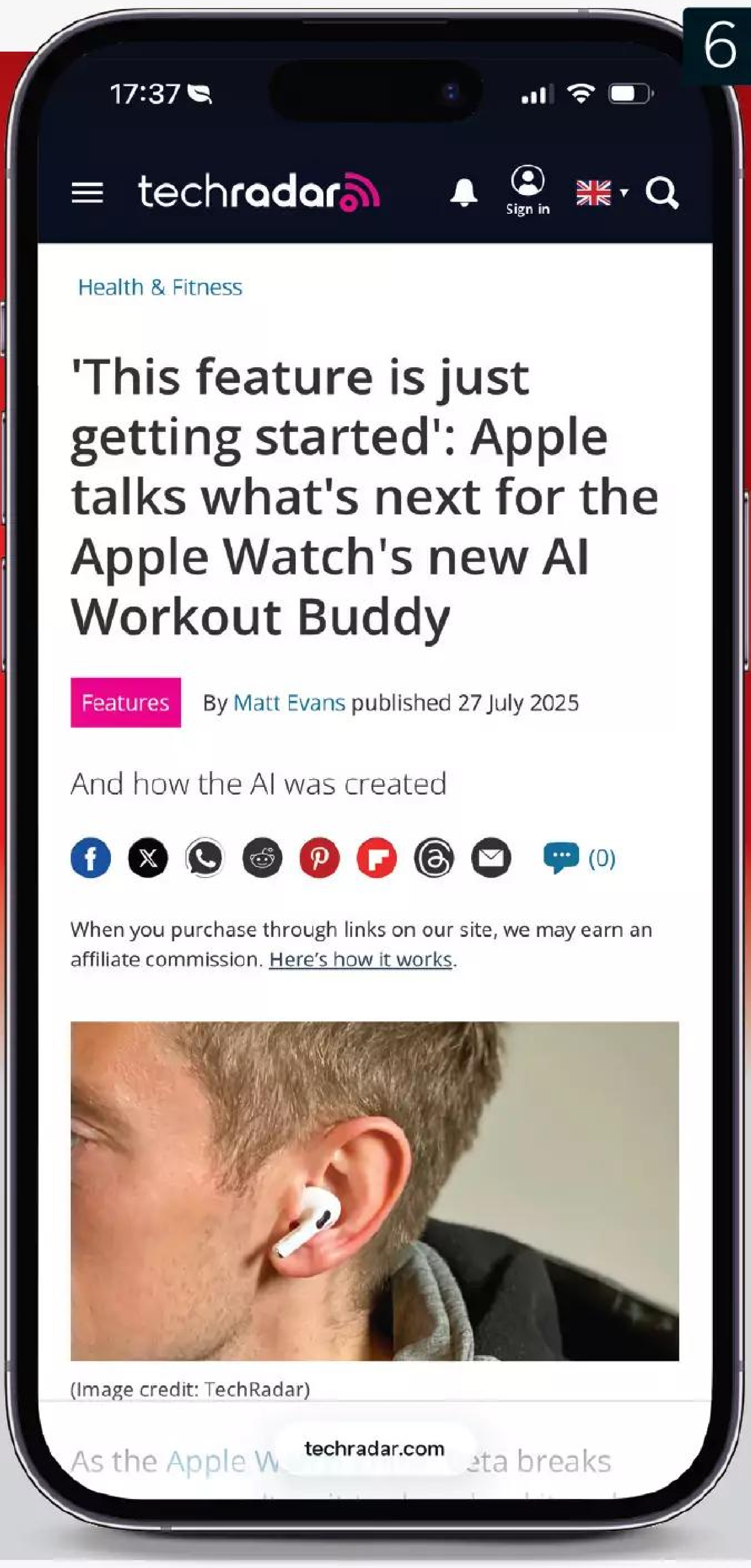
TECHRADAR.COM
'This feature is just getting started': Apple talks what's next for the Apple Watch's new AI Workout Buddy
Jul 31st · Apple's new Workout Buddy on th...
Matt Evans · 5 mins

POPSCI.COM
A 13th-Century Schoolboy's Doodles Show That Kids Have Always Been Like That
Jun 7th · Plus other weird things we learne...
Popular Science Team · 3 mins left

TIME.COM
10 Things to Say When Someone Won't Get Off Their Phone
Jun 6th · Phubbing, or phone snubbing, makes people feel unimportant and negativ...
Angela Haupt · 3 mins left

VULTURE.COM
Everyone Is Already Using AI (And Hiding It)
Jun 5th · Many filmmakers in Hollywood are secretly usin production c



6

Health & Fitness

'This feature is just getting started': Apple talks what's next for the Apple Watch's new AI Workout Buddy

Features By Matt Evans published 27 July 2025

And how the AI was created

(0)

When you purchase through links on our site, we may earn an affiliate commission. Here's how it works.

(Image credit: TechRadar)

As the Apple W eta breaks

# Readwise Reader

Free (IAPs) **FROM** readwise.io/read **FOR** iOS, Android, browser

5 Readwise Reader is an almost perfectly formed read-it-later app. It has one of the most pleasing designs on test, with extensive customisations available for both text and the app itself. You can save RSS feeds, books, PDFs, emails, tweets and videos in addition to articles, search with ease thanks to detailed filters or browse by tags, and the app even generates a contents list to quickly jump to important page sections.

It's overflowing with other thoughtful features. Highlighting happens automatically when you press and hold a text snippet; there's a snooze-like Later list, and a Daily Digest to help you rediscover previous saves; and Wisereads that surface the most popular passages of the week. Unlike some apps, it's AI isn't limited to summarising text: its handy tools include explainers and quizzes, and it can summarise the paragraph before your current location to help refresh your memory. That all makes Readwise Reader a top contender.

## VERDICT

**Tons of handy features and a useful AI assistant. But no shortcuts or widgets and hard to find Wisereads.**

★★★★★

# Safari Reading List

Free **FROM** apple.com/au **FOR** iOS

6 Safari's Reading List is built right into Apple's web browser, making it the easiest solution to get started with here. It's super simple to use: find a web page you want to save, tap the Share button, then select 'Add to Reading List'. Once you've done that, tap the Show Bookmarks button (which looks like an open book), then pick the Reading List tab (akin to a pair of glasses) to find your saved articles. Tap one and you're taken to its website to read it.

Unfortunately, Safari's Reading List is pretty barebones. It lacks tags, highlights and customisable designs, while you can't archive articles or tap into an AI helper (not even Apple Intelligence).

On the plus side, you get offline reading, iCloud syncing, plus a few handy Shortcuts integrations. But the fact remains that Safari's offering is a far more limited option than its rivals, so is only really ideal if you don't need many features or don't want to pay for a new app.

## VERDICT

**Free, easy to use and built into Safari. But it's very basic and there's no Pocket import included.**

★★☆☆☆

Image credits: Apple Inc, Readwise Inc, Recurrent, Time USA LLC, Vox Media LLC

**THE WINNER**

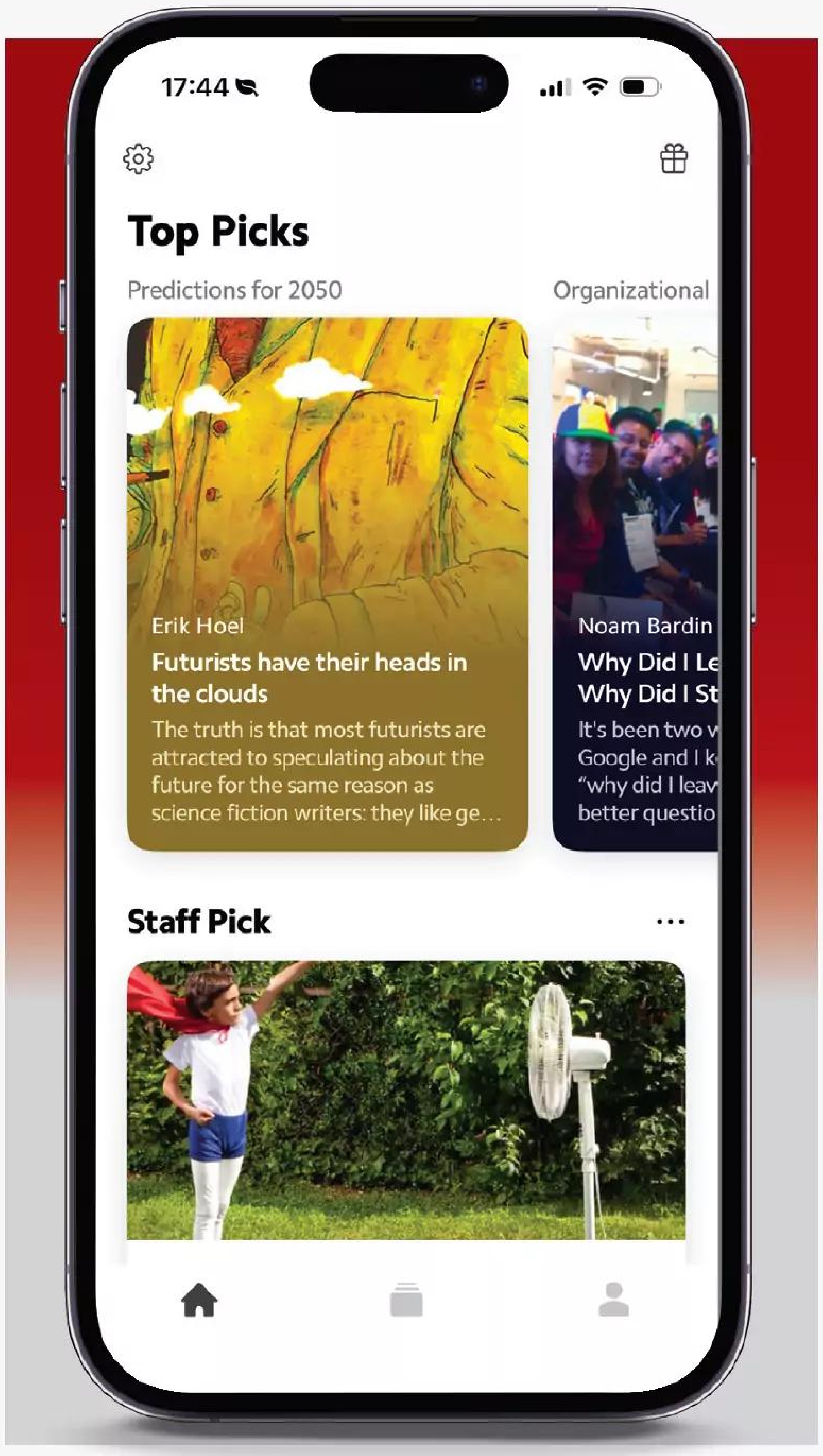
# Matter

## A worthy Pocket successor.

**Safari's Reading List is free, but it's pretty rudimentary and likely won't satisfy former Pocket users. Raindrop.io offers more and is ideal for minimalists, but it's a little too lightweight to appeal to power users.**

At the opposite end of the spectrum is GoodLinks, which is crafted for people who want more. We love its devotion to Shortcuts and its gorgeous design, but feel it has a few oversights that rival apps have got nailed down. Similarly, Instapaper has plenty of clever ideas and offers a lovely reader view, yet it just doesn't feel quite as enjoyable to use as some of its competitors.

That leaves us with a dead heat between our final two: Matter and Readwise Reader. There's nothing to pick between them, but your choice ultimately comes down to how much you value article curation. Since this test is all about finding Pocket replacements, Matter just about gets the nod thanks to its Pocket-like ability to supplement your own saves with reading material from around the web.


17:44

Top Picks

Predictions for 2050

Organizational

Erik Hoel

Futurists have their heads in the clouds

The truth is that most futurists are attracted to speculating about the future for the same reason as science fiction writers: they like ge…

Noam Bardin

Why Did I Le

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Staff Pick

## How do they compare?

| Specs | GoodLinks | Instapaper | Matter | Raindrop.io | Readwise Reader | Safari Reading List |
|---|---|---|---|---|---|---|
| **Website** | goodlinks.app | instapaper.com | hq.getmatter.com | raindrop.io | readwise.io/read | apple.com/au |
| **Price** | $14.99 | Free (IAPs) | Free (IAPs) | Free (IAPs) | Free (IAPs) | Free |
| **Paid subscription starts at** | N/A | US$5.99/month | $12.99/month | $4.99/month | $12.99/month | N/A |
| **Import Pocket saves** | Yes | Yes | Yes | Yes | Yes | No |
| **Offline reading** | Yes | Yes | Yes | Yes | Yes | Yes |
| **Archive** | No | Yes | Yes | Yes | Yes | No |
| **Curated article discovery** | No | No | Yes | No | Yes | No |
| **Highlights** | Yes | Yes | Yes | Yes | Yes | No |
| **Tags** | Yes | Yes | Yes | Yes | Yes | No |
| **Notes** | Yes | Yes | Yes | Yes | Yes | No |
| **Favourites** | Yes | Yes | Yes | Yes | Yes | No |
| **AI** | No | Yes | Yes | No | Yes | No |
| **Shortcuts integrations** | Yes (28) | Yes (14) | Yes (1) | No | No | Yes (3) |
| **Page customisation** | Yes | Yes | Yes | Yes | Yes | No |
| **App customisations** | Yes | Yes | Yes | Yes | Yes | Yes |
| **App can read articles aloud** | Yes | Yes | Yes | No | Yes | No |
| **Extra features** | 28 shortcuts, extensive customisations, 7 Home page widgets | AI article summaries, Speed Read, 14 shortcuts | Curated articles, AI assistant, podcast transcription | Clean design, app and reader customisation | Attractive reader view, AI assistant, Daily Digest, Wisereads | Offline reading, iCloud sync |

Note: The final verdict scores reflect the overall opinion of a product and are not necessarily an average of the criteria listed in the table.

Image credits: Apple Inc, Ngoc Luu, Instant Paper Inc, Dig Wells Inc, SP Rustem Mussabekov, Readwise Inc

# MYSTERIES OF IP EXPLAINED

555.244.244
195.455.455
55.244.244
199.199.199
199.199.199
188.188.188
199.199.199
555.244.244
233.577.488
555.244.244
195.455.455
555.244.244

**We rely on IP every day, yet most of us are hazy on the details of how it works. Darien Graham-Smith tackles common questions about addressing, routing, ports, packet sizes and more.**

From cheap home routers to enterprise data centres, every internet-enabled device runs on IP. Together with TCP – the protocol that allows remote systems to connect and reliably exchange data with one another – IP underpins our connected lives, and has been doing so for years. Whether you've wanted to or not, you've probably absorbed a certain working familiarity with IP.

When it comes to the finer details, though, things get more mysterious. A typical router interface offers any number of advanced settings whose meanings are far from clear, and while you may know that certain aspects of the setup need to be just so, the reason is rarely obvious. Let's look at some of the more puzzling questions relating to IP – and at last get some understandable answers.

## Why do all my IP addresses start 192.168...?

You probably know that all the IP addresses inside your home network are managed by your router, and that they're only valid inside your network. So you might wonder why – at least when we're talking about IPv4 – they all have to be in the seemingly random range of 192.168.x.x. Why not start at 1.1.1.1 and work your way up from there?

The simple answer is that way back in 1996 the Internet Engineering Task Force officially carved out a few specific address ranges – ones that weren't already in use at that time – for use on private LANs. The IP address 1.1.1.1 isn't included in one of these reserved blocks; it's a public address that's intended to be accessible from anywhere on the internet, and which currently happens to be owned by Cloudflare, which uses it to host a DNS service. If you tried to simultaneously give that same address to a device on your home network, the duplication would lead to major routing problems.

For this reason, routers restrict your network to designated blocks of private addresses, usually in the range between 192.168.0.0 and 192.168.255.255. This range allows for 255 x 255 = 65,536 unique addresses within a LAN; a few of these are reserved for particular purposes, such as the base address 192.168.0.0 which refers to the entire network, but that still leaves plenty of addresses for any home or small business.

Even so, this is actually the smallest of the three reserved ranges. Another one extends from 172.16.0.1 to 172.31.255.255, offering 1,048,576 LAN addresses, while the largest private range spans all the way from 10.0.0.1 to 10.255.255.255, allowing for more than 16 million devices in one private network. These huge ranges might be used by global companies such as Google or IBM, although they require careful segmentation and management, or the sheer volume of traffic becomes overwhelming.

This is why home routers generally stick to the smallest range – in fact, they normally default to using a subset of just 255 addresses within this range, which they assign automatically to connecting clients via DHCP (the dynamic host configuration protocol). Irritatingly, though, there doesn't seem to be any consensus as to whether the default address space starts at 192.168.0.1 or 192.168.1.1 – that just depends on who made the router.

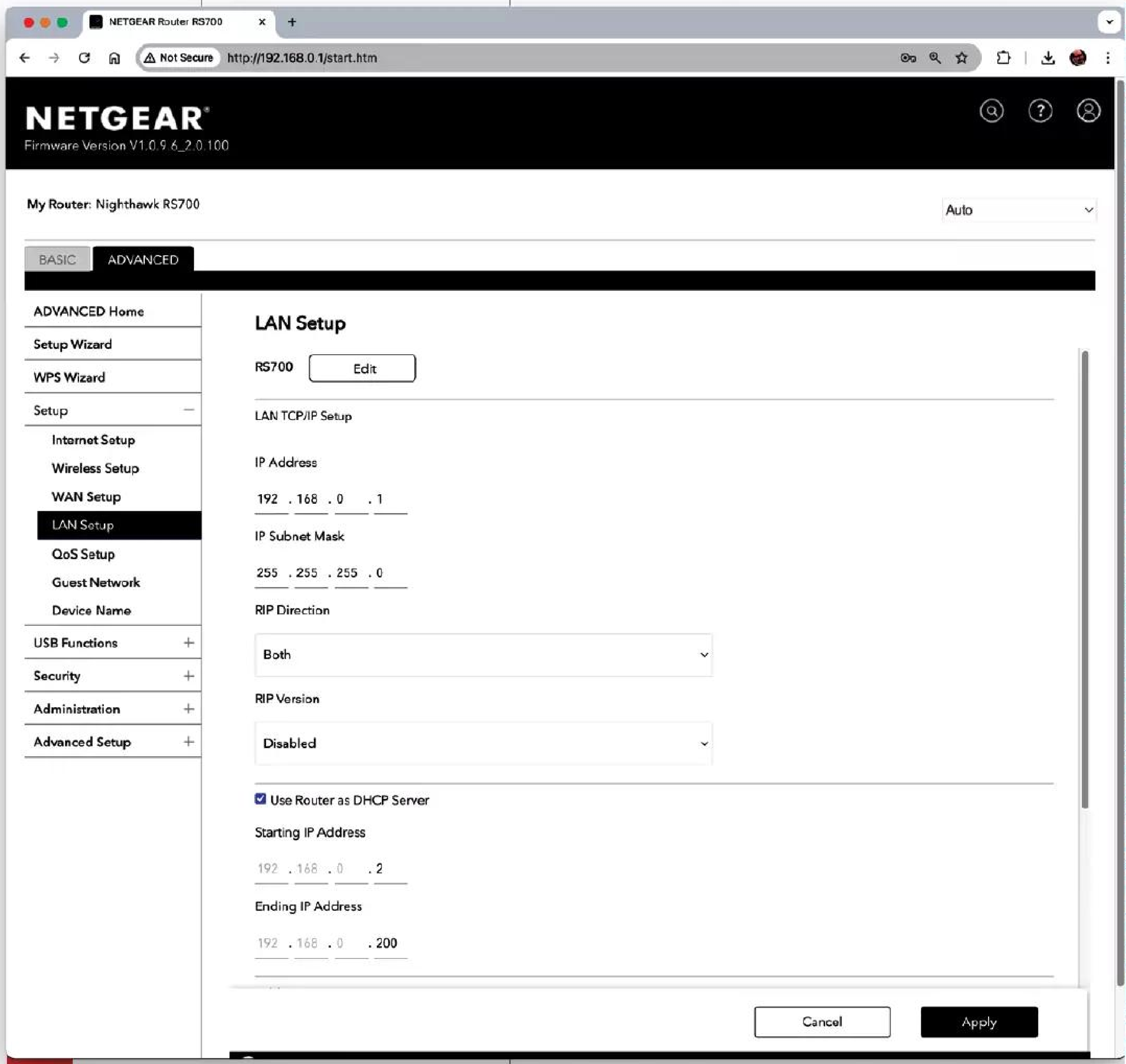
## What is a subnet mask?

If you've ever configured an IP connection manually, you'll have been asked to provide the address of the network gateway (your router), and also a subnet mask. For a home network this is usually 255.255.255.0 – but what does that mean?

Simply put, the mask defines which addresses are on the same subnet, meaning they're "local" and able to connect directly to each other. Where you see a value of 255, that means that this part of the IP address needs to match the gateway's own IP address in order to be local; a zero means that a unique number (or combination of numbers) goes here to specify the device's individual address.

If that sounds confusing, you can normally just remember that the standard 255.255.255.0 mask means that all addresses from 192.168.0.1 to 192.168.0.255 are local to each other; if your netmask is 255.255.0.0, addresses from 192.168.0.1 to 192.168.255.255 will be treated as local.

Behind the scenes, masks are based on binary representations of IP addresses. A netmask of 255.255.255.0 corresponds to four binary octets (bytes), with values of 11111111.11111111.11111111.00000000. The bits that are set to one define the network prefix, which must be the same for all local hosts, while zeros indicate the bits that are used for addressing.



**BELOW** You can choose the address range your router uses – within limits.

NETGEAR Router RS700

Not Secure http://192.168.0.1/start.htm

NETGEAR

Firmware Version V1.0.9.6_2.0.100

My Router: Nighthawk RS700

Auto

LAN Setup

RS700

LAN TCP/IP Setup

IP Address

192 . 168 . 0 . 1

IP Subnet Mask

255 . 255 . 255 . 0

RIP Direction

Both

RIP Version

Disabled

☑ Use Router as DHCP Server

Starting IP Address

192 . 168 . 0 . 2

Ending IP Address

192 . 168 . 0 . 200

**Whether you wanted to or not, you've probably absorbed a working familiarity with IP**

A mask can never contain a mixture of ones and zeros. It must always start with some number of ones, followed by zeros for the rest of its 32-bit length. However, the switch from ones to zeros doesn't have to align with the byte boundary: you could, for example, use a mask of 11111111.11111111.11111111.11000000 (255.255.255.192) to define a local address space of six bits, allowing for values between 1 and 64. For a bigger network you could use 11111111.11111111.11111100.00000000 (255.255.252.0), giving you 1,024 available addresses.

Another convenient way to define address ranges is with a model called CIDR notation. This stands for "classless inter-domain routing" – classless because it replaces an old system that formally divided up the entire IPv4 address space into fixed-size "classes".

CIDR handily combines the base address of the network and the size of the network prefix into a single expression, separated by a slash. So, if your router uses the 192.68.0.0. address range with a mask of 255.255.255.0, that becomes 192.168.0.0/24 in CIDR notation. If you don't need so many clients, you could shrink the address space down to 192.168.0.0/25, using only the seven rightmost bits for addressing, with values running from 192.168.0.1 to 192.168.0.127. If you wanted, you could then set up a second subnet to start right after the first, defined as 192.168.0.128/25.

## Are subnets and VLANs the same thing?

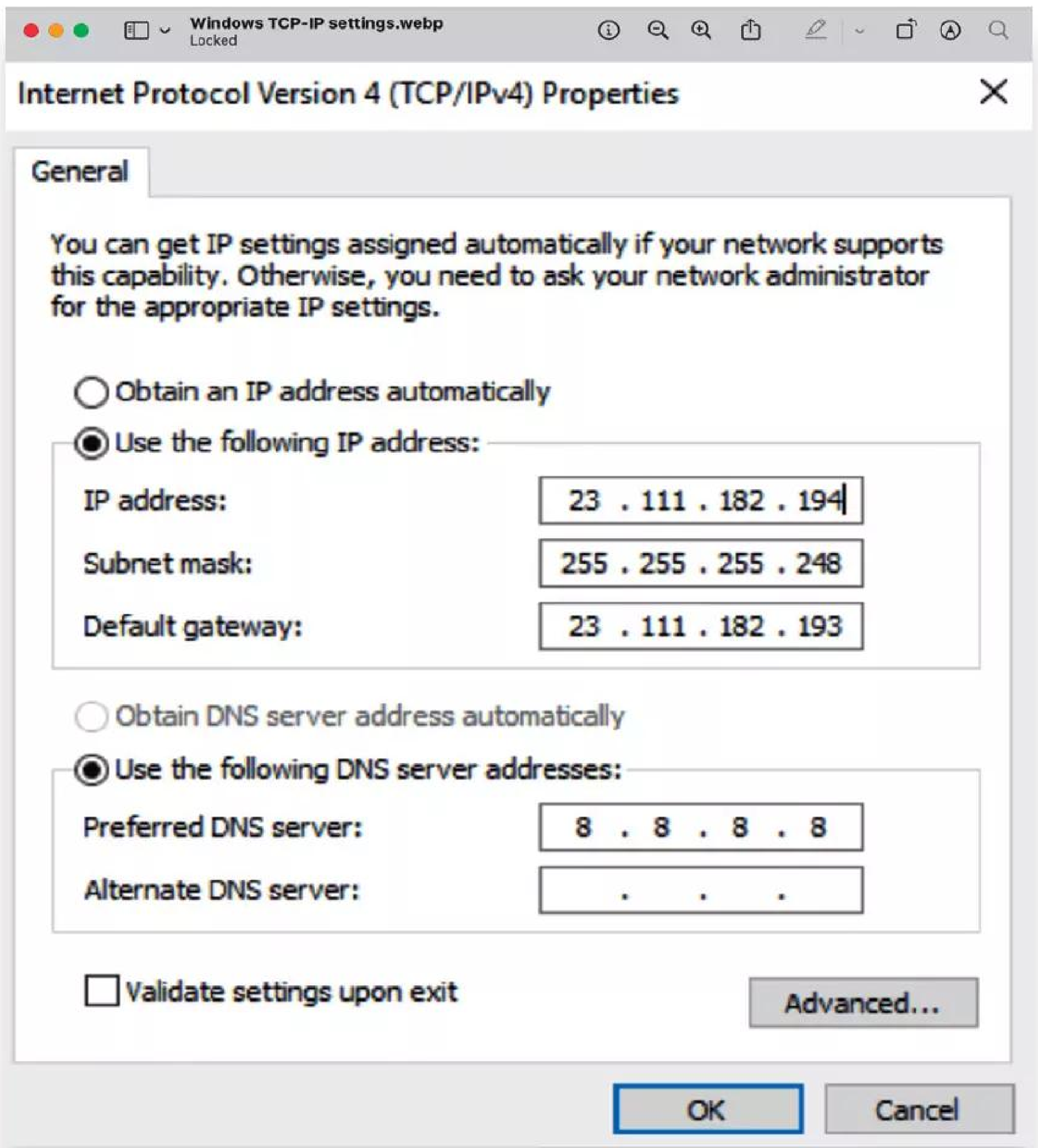
Most business routers – and some home ones – let you set up virtual LANs within your home network. Superficially, these seem a lot like subnets, as they divide up the available address space into separate segments. However, while devices on different subnets can normally see and communicate with one another via the router, VLANs are segmented at a more fundamental level, and behave as if they were physically separate networks.

These different segmentation models are useful for different things. Subnets are ideal if, for example, you want to monitor traffic passing between clients and internet-facing servers; VLANs are better when you want different groups of devices to be completely isolated. For example, many home routers will let you set your guest network as a VLAN, so that connected devices can access the internet, but have no access to devices on the main home network. There may also be a dedicated VLAN for your smart lightbulbs and power sockets, with its own SSID – so that if someone compromises their security, they can't use them as stepping stones to break into more sensitive computers and NAS appliances.

## Whatever happened to IPv6?

It seems we've been talking about IPv6 forever, so no doubt you already know the idea behind it. The 32-bit address space of IPv4 only allows for around 4.3 billion unique addresses, which isn't ideal in an increasingly connected world of eight billion people. IPv6 solves that problem by allowing for $2^{128}$ unique addresses, or approximately 34 followed by 37 zeros. That's enough to give an IPv6 address to every speck of space dust in the known universe.

Yet somehow, 30 years after it was invented, IPv6 is still hanging around on the sidelines. Rather than embracing a costly, complex global changeover, we've eked out the supply of IPv4 addresses through measures such as network address translation – where every device on your LAN shares a single external internet address – and precise ranging with CIDR, so that networks don't have to occupy more address space than they need.



Internet Protocol Version 4 (TCP/IPv4) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically
● Use the following IP address:
IP address: 23 . 111 . 182 . 194
Subnet mask: 255 . 255 . 255 . 248
Default gateway: 23 . 111 . 182 . 193

○ Obtain DNS server address automatically
● Use the following DNS server addresses:
Preferred DNS server: 8 . 8 . 8 . 8
Alternate DNS server: . . .

☐ Validate settings upon exit

**TOP** The subnet mask defines which addresses are local to your network.

**ABOVE** Most routers nowadays support IPv6 — if you want them to.

Things have also been helped by the rise of carrier-grade network address translation (CGNAT), which allows ISPs to share one external IP address across any number of subscribers. This isn't universally popular, as it breaks port forwarding – as we'll discuss below – but it certainly reduces the pressure on IPv4 addresses. Some estimates suggest that 10% of home broadband connections are using shared CGNAT addresses, and likely a much higher proportion of mobile connections.

Yet it would be a mistake to think that IPv6 has flopped. Most modern routers can run IPv4 and IPv6 in parallel, and today's laptops and smartphones will happily operate on "pure" IPv6 networks; if you wanted you could turn IPv4 off right now. The major obstacle is that not all ISPs support IPv6 connections, and in your own home you'd lose access to any legacy devices such as printers, games consoles and smart home gadgets that aren't yet ready for IPv6.

Still, support is gradually becoming more widespread. There will probably come a day in the next decade when you can fully switch over to IPv6 with zero disruption. For many people it may happen when a new router or firmware update turns off IPv4 services, and they won't even notice it.

## How does port forwarding work — and what is UPnP?

IPv4 address translation is fine for most domestic purposes, but it only works when the connection is initiated from inside the private network. If you want to run a server inside your home network that's capable of accepting unsolicited connections from over the internet then you've got a problem: a remote client can send a connection request to your router using your external IP address, but it has no direct way of specifying which particular device within the private network it wants to contact.

Port forwarding solves this problem by taking advantage of the fact that TCP/IP connections must specify not only a destination address but also a virtual port number, ranging from 0 to 65,535. Any computer service that accepts incoming connections can – indeed must – listen only on specified ports; this means you can offer multiple services from a single network address, perhaps all running on the same computer, with no interference or conflicts.

To configure port forwarding, you simply tell the router that requests for a specific port should be forwarded to a specific address on the local network. For example, if you want to run a web server on your home computer, you can configure your router to forward all requests on port 80 – that being the standard port for HTTP connections, as defined by the Internet Assigned Numbers Authority.

You're not forced to follow standard port numberings, but changing them willy-nilly could result in conflicts or blockages. The one reason you might want to do so is if you want to run, say, two web servers on the same LAN; the router can only map one port to one client, so if you want to run two servers of the same type they have to be on different ports.

If you think this all sounds a little tiresome, you're not alone. In 1999 a technology called UPnP ("universal plug 'n' play") was introduced which allows applications to talk directly to the router and automatically configure their own port forwarding rules, so server software "just works" with no manual configuration. It can also remove the need for port triggering, where the router forwards inbound connections on a specified port to whichever LAN client has an active outbound connection open on a different port – useful for some games or communications services.

However, while UPnP takes some of the pain out of network configuration, security experts often recommend disabling it. Since the technology doesn't use any sort of authentication, in theory it could be abused by malware to open up ports on your router that could then be exploited by a remote attacker.

As we've noted, port forwarding

also fails if your ISP is using CGNAT – because when someone tries to connect to your external IP address, the ISP's own router doesn't know which of the hundreds of customers using that address they're trying to reach. The best solution, if your ISP and router permit it, is to use IPv6: since IPv6 addresses are globally unique, any device can connect directly to any other from anywhere, with no need to mess around with address translation or port forwarding, as long as there aren't any firewalls or other technical obstructions in the way.

## What is an MTU, and can it speed up my internet?

Sometimes you'll see someone online complain that their internet connection is running slowly, and someone else will suggest changing the MTU. This is a much-misunderstood setting that's applied at the network controller – so each device on your network will have its own MTU value, as will the router.

The abbreviation stands for maximum transmission unit, and it determines how much information is packed into each IP packet that's transmitted over an Ethernet or Wi-Fi connection. The default for an Ethernet connection is 1,500 bytes, although for some types of DSL internet connection it's 1,492 bytes (because the connection itself entails a small overhead). Some wired networks allow "jumbo frames", containing up to 9,000 bytes of data per packet.

MTU can make a palpable difference to performance. The smaller your MTU, the more packets must be sent to convey a given quantity of data. This wastes bandwidth, as each packet needs to contain a header, containing information such as the source and destination IP addresses, as well as your block of payload data.

If you make the MTU too large, however, you can run into problems with the internet servers that are supposed to forward your data to its destination. These aren't designed to handle huge chunks of data, and may reject outsized IPv4 packets, asking for them to be "fragmented" into smaller ones – leading to a greater processing overhead and a slower overall experience. You could even run into a "black hole" scenario, where the originating network controller doesn't realise that an upstream router can't process its packets, so the transfer is never completed and the transmission just times out.

To find the best MTU for your internet connection, you can use the ping command from the Windows command prompt as follows:

```
ping 1.1.1.1 -f -l 1472
```

This "pings" the Cloudflare DNS server we mentioned (although you can use any internet server) with a specified packet size of 1,472 bytes – equivalent to 1,500 bytes once the standard IP header for a ping request has been added.

If you get an error message saying "Packet needs to be fragmented", you know that something along the way is breaking up your packets. Experiment with turning it down until you get a successful response, then set the MTU for that interface to the specified packet size, plus 28 bytes. To do this, find out the name of your internet connection by entering:

```
netsh interface ipv4 show subinterfaces
```

Then enter this command, substituting the name of your network connection for "Local Area Connection":

```
netsh int ipv4 set subinterface "Local Area Connection" mtu=1492 store=persistent
```

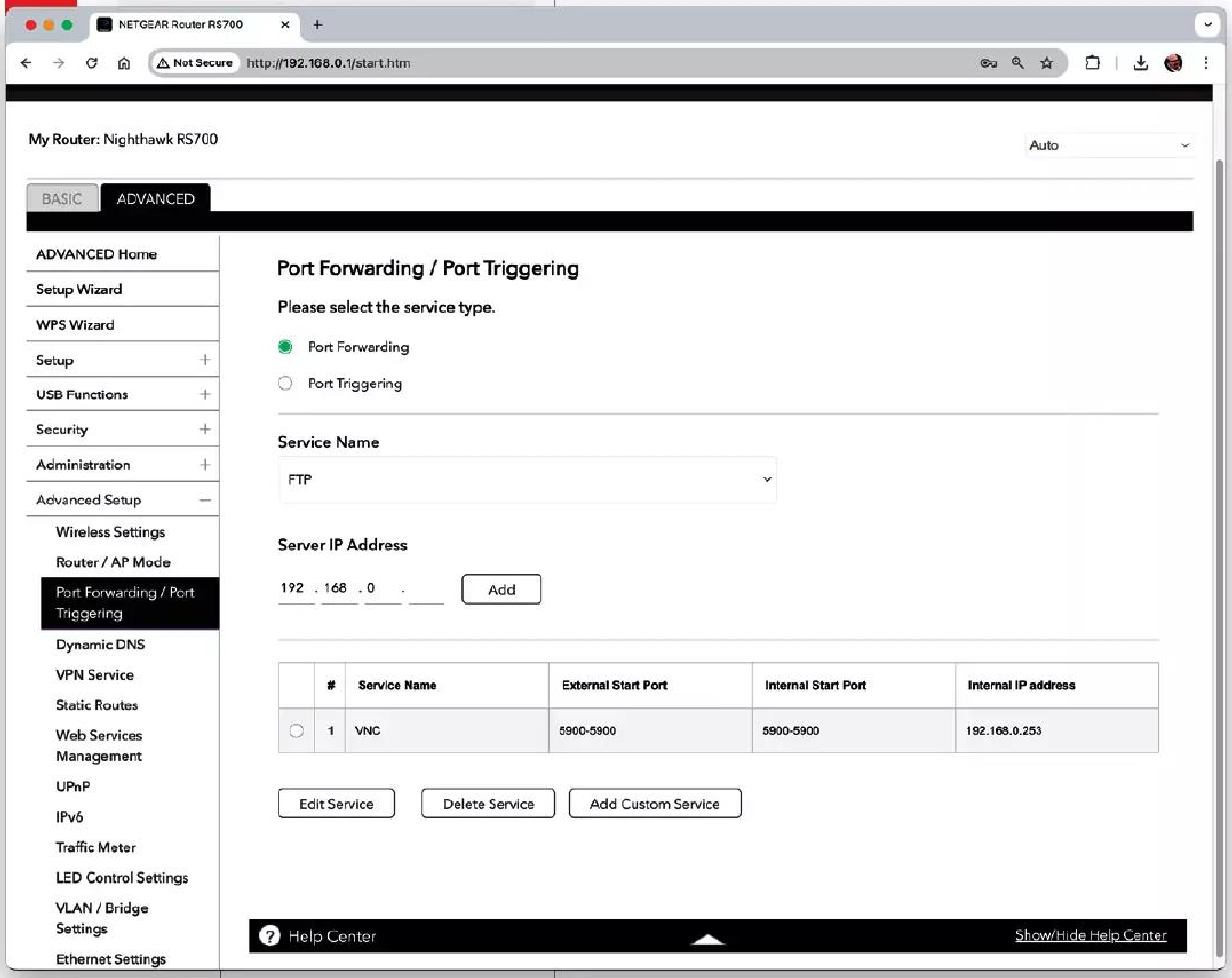
## Should I hide my IP address?

Some commentators will warn you that it's risky to expose your IP address online. At the same time, many of these commentators are trying to sell you anonymising VPN services – so what's the truth?

The nightmare scenario is that someone might use your IP details to track down your name and address, and show up at your home to assault or rob you. Don't panic, though – that's not a realistic threat. It's true that your external IP address can be used to identify your ISP, by checking the public record of which company it's registered to, and by combining this with routing information it's possible to guess at what town or city you're located in. However, unless you're using a very small, local ISP, the IP address is unlikely to reveal anything more specific than that. To check this for yourself, visit a free geo-IP detection website such as **ipgeolocation.io** and see what it says.

**If you want to avoid tracking, the easiest solution is to use a commercial VPN service**

It's slightly more plausible that someone who knows your IP address could target you for a brute-force attack, spamming your router with connection attempts to see if they can get access to your network. This, however, would involve a focused effort for a very uncertain reward – opportunistic scammers are more likely to cast their nets more widely, using mass phishing attempts or malware attacks that don't rely on IP addresses.



My Router: Nighthawk RS700

Port Forwarding / Port Triggering

Please select the service type.

● Port Forwarding

○ Port Triggering

Service Name: FTP

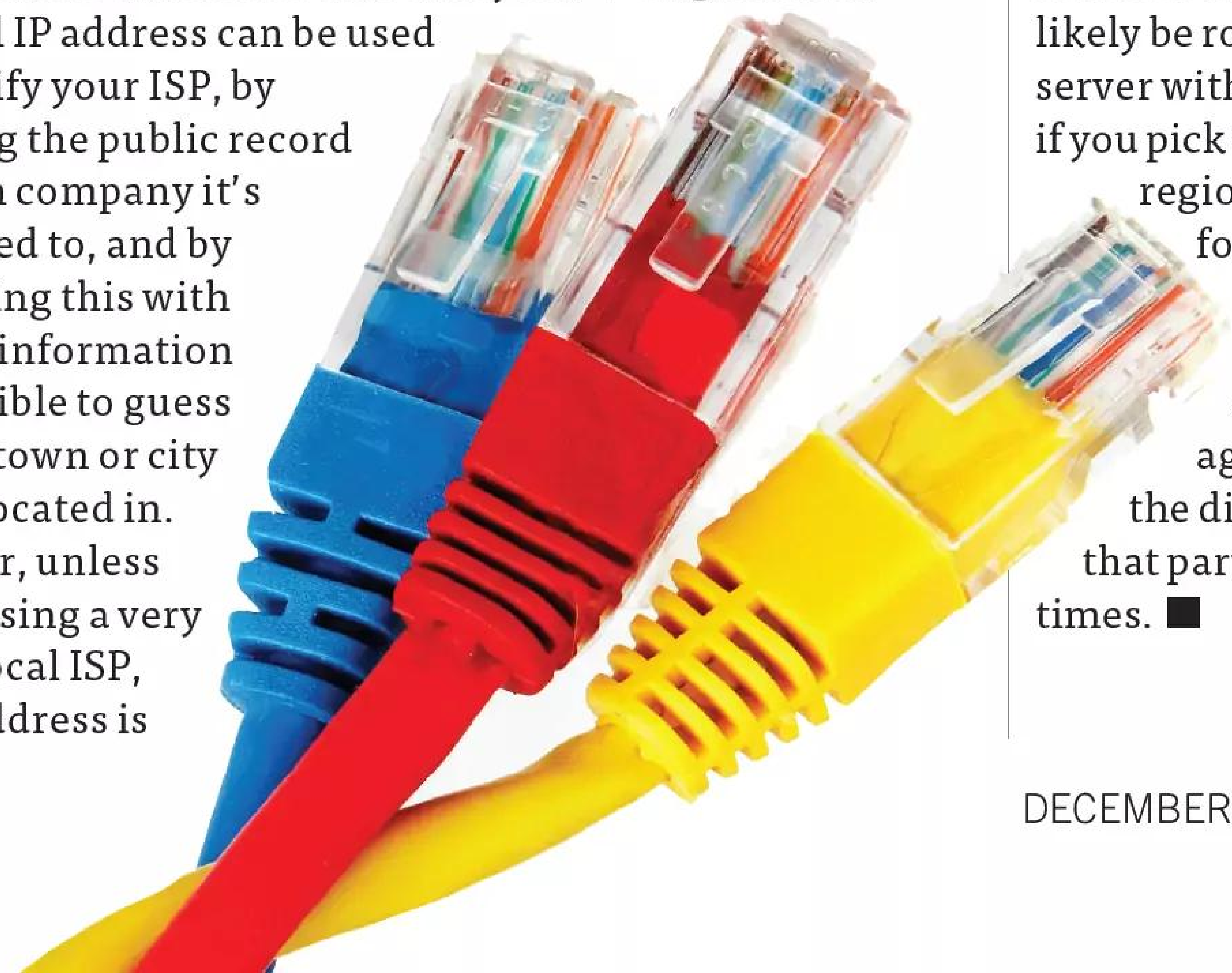
Server IP Address: 192 . 168 . 0 .

| | # | Service Name | External Start Port | Internal Start Port | Internal IP address |
|---|---|---|---|---|---|
| ○ | 1 | VNC | 5900-5900 | 5900-5900 | 192.168.0.253 |

**ABOVE** Port forwarding lets external devices connect to ones inside the network.

The biggest concern is "fingerprinting", where remote servers build up a profile of you, based on activity linked to your IP address. As well as the main site operators, advertisers can pick up the fact that you saw a particular advert while visiting a particular site at a particular time. Is this dangerous? Probably not in any physical sense. Is it creepy and annoying? You bet.

If you want to avoid this sort of tracking, the easiest solution is indeed to use a commercial VPN service. Each time you connect you'll likely be routed through a different server with a different IP address (even if you pick the same geographical region). That makes it impossible for third parties to build up a consistent profile of you – although they may get some strange ideas if they try aggregating their data from all the different people who've used that particular server at various times. ■



**BELOW** VLANs let you run separate networks on a single router.

Find the best deals
on new gear at
getprice.com/au

# The A-List

The best products on the market, as picked by our editors.

## Premium laptops

### Apple MacBook Pro M4

**One of the best laptops that's ever been made.**

This M4 update to the already brilliant MacBook Pro line is an easy recommendation, so the big question becomes do you choose the 14in version or 16in. But whatever you choose should last for years, and look great while it's doing it.

**PRICE** From $2,499 **WEB** apple.com/au

**THE ALTERNATIVES**

**ASUS ZENBOOK A14**
This affordable and super-slim laptop with a 14in OLED panel has all the performance most people need at a very competitive price, and it boasts fantastic build quality.
$1,999, asus.com

**APPLE MACBOOK AIR M4**
If you don't need the all-out power of the Pro, this is a brilliant, cheaper alternative despite the unchanged chassis and screen.
From $1,699
apple.com/au

**MICROSOFT SURFACE LAPTOP 7**
A shining example of just how good a Windows laptop can be. Despite a few minor drawbacks, the Surface Laptop is a fantastic package that offers performance and battery life.
$1,899, microsoft.com

## Business laptops

### HP OmniBook X

**the qualcomm CPU really delivers.**

The latest Qualcomm CPU helps create a standout laptop that will impress compared to Intel powered alternatives. The OmniBook X has been on sale across all major retailers for $2,079. At this sort of price the X is the cheapest Snapdragon X Elite laptop going, and a compelling buy.

**PRICE** From $2,079 **WEB** hp.com

**THE ALTERNATIVES**

**DELL PRO 13 PREMIUM**
Dell's business laptop series has a new name, but its commitment to build quality and astonishing levels of configuration remain the same.
From $2,536
dell.com/en-au

**ASUS ZENBOOK S 16**
The Asus Zenbook S 16 offers premium performance in the ultraportable category and competes well with alternatives such as the Surface Laptop 7 or Macbook Pro.
$3,499, asus.com.au

**LENOVO THINKPAD X1 CARBON GEN 13**
The best executive laptop out there, with true all-day battery life. At 1kg and with the latest components, it's worth the price.
From $3,300, lenovo.com/au

## Gaming laptops

### Alienware m16 R2

**A premium and affordable gaming & work machine.**

There are cheaper gaming laptops, and faster ones too, but we love the balance offered by the m16 R2. Who doesn't want a big 16in gaming laptop, featuring a Ultra 9 CPU, a RTX 4070 GPU and 32GB of RAM? And for a decent price, considering it's from Alienware.

**PRICE** $3,300 **WEB** dell.com

**THE ALTERNATIVES**

**LENOVO LEGION PRO 7I GEN 10**
A surprisingly elegant chassis considering the power within. Lenovo doesn't put a foot wrong with this.
From $3,749
lenovo.com/au

**ACER NITRO V 16**
It's a cheap and cheerful gaming laptop, but that's exactly what the Nitro V series does best, and overall this new 16in model offers great bang for buck.
$1,500
store.acer.com

**ASUS ROG ZEPHYRUS G14 (2025)**
AMD's Ryzen AI 9 HX 370 CPU combined with the RTX 5080 GPU in this slimline chassis complete with 14in OLED panel.
$6,999, asus.com

## Everyday laptops

### Lenovo Yoga Slim 7x

**A beautiful machine that combines style, great tech and strong value.**

Lenovo fought off all-comers in our most recent group test due to its all-round quality – we love the slimline, blue, all-metal design and 14.5in OLED panel – and the fact that its battery keeps this 1.3kg laptop going for over 20 hours. It's a great advert for Qualcomm's Snapdragon X Elite chips.

**PRICE** From $1,949 **WEB** lenovo.com/au

**THE ALTERNATIVES**

**ASUS VIVOBOOK S15**
This affordable laptop still includes an all-metal shell and 15.6in OLED panel, saving money by using a solid 8-core Snapdragon X Plus chip.
$1,999, asus.com

**MICROSOFT SURFACE PRO (X ELITE)**
The versatile top of the line Surface Pro 2-in-1 sports the 12 core Snapdragon X Elite. Its OLED screen is stunning.
From $2,699,
microsoft.com

**MICROSOFT SURFACE LAPTOP 13-INCH**
Another Microsoft laptop powered by a Snapdragon chip, but it's low power so this stylish laptop is best for less demanding tasks.
From $1,358,
microsoft.com

## Chromebooks

### Asus Chromebook Plus CX34

A sleek and relatively affordable ChromeOS workhorse, the Asus Chromebook Plus CX34 delivers strong performance and features at a competitive price when on sale, and is ideal for budget-conscious users.

**$699, asus.com**

### Lenovo Flex 3i Chromebook

This isn't the most powerful Chromebook, but students need reliability more than power – especially if they're only really using it for homework, note-taking, and perhaps the occasional bit of Netflix.

**$367, lenovo.com/au**

### Lenovo IdeaPad Duet

The Chromebook answer to Microsoft's Surface tablets, this is a seriously versatile device – albeit not the speediest (although we never found it to be painfully slow while carrying out everyday tasks). For this price, and with a 16hrs 14mins battery life, the Duet is a great choice.

**$297, lenovo.com/au**

## Tablets

### Apple iPad Air (M3)

It's hard to be too excited by this update as it's exactly the same design but with an M3 chip inside. But when the original was so damn good, whether in 11in or 13in variants, and Apple Intelligence is thrown in, it remains the best choice for the vast majority of tablet buyers.

**From $999, apple.com/au**

### Apple iPad Pro (M4)

The best tablet in the world becomes even better thanks to Apple's stunning M4 chip, a gorgeous OLED screen and the must-have accessory: the all-new Pencil Pro. But it comes with an obvious downside of cost, with the cheapest 13in incarnation costing $2,199.

**From $2,199, apple.com.au**

### Samsung Galaxy Tab S9 Ultra

This 14.5in tablet offers a size and versatility that even the iPad Pro can't match, with its high price more than justified by the quality of Samsung's AMOLED panel, speakers and productivity software.

**$1,999, samsung.com**

## Everyday & gaming monitors

### Asus ROG Swift OLED PG32UCDP

We've seen several ultimate gaming monitors in recent months but, from the specs alone, Asus might just have made the most *ultimatest*: 480Hz refresh rate, matte-screen HDR OLED, 32-inch 4K.

**$2,399, asus.com.au**

### BenQ GW2790QT

Targeted at office users, this 27in, 1440p monitor is packed with quality, from its brilliant OSD to several clever features designed to fight eye fatigue. Text and images look sharp and punchy, its USB-C docking capability is always welcome.

**$459, benq.com**

### LG UltraGear 45GX950A

This doesn't settle for anything less than being the best. Operating an enormous 5K/2K resolution with a 165Hz/330Hz refresh rate, the UltraGear satisfies the needs of competitive and cinematic gamers alike – at a fairly high cost.

**$3,499, lg.com**

## Professional monitors

### Asus ProArt Display 6K PA32QCV

Asus' 6K professional display aims to deliver uncompromising performance to creative workers. Image and video editing is a joy thanks to all the screen real-estate and it's generally brilliant to interact with.

**$2,499, asus.com**

ASUS ProArt

### BenQ DesignVue GW2730S

A great choice for creative professionals and demanding users alike, and if your budget can take it why not daisy-chain two together over Thunderbolt? You'll love the image quality and 5K resolution.

**$459, eizoglobal.com**

### MSI Modern MD342CQPW

A high-quality panel that includes all the features most people need. Sure, it could go brighter and it lacks USB-C ports and RJ45 networking, but it packs quality exactly where it counts.

**$699, msi.com**

## Home office printers

### HP OfficeJet Pro 9130e

This versatile inkjet all-in-one – which includes a 35-page ADF – pumps out high-quality prints at laser-rivalling speeds. Likewise scans and copies. Print costs are reasonable, too.

**$248, hp.com**

### Canon i-Sensys LBP243dw

Everything you could want from a mono laser printer – it doesn't come with a scanner – the LBP243dw produces excellent results at speed. You also get Wi-Fi and wired networking.

**$479, canon.com**

### Brother MFC-J4540DW

Home workers will love this inkjet all-in-one. It combines an incredible range of features with all the connectivity you need and extreme ease of use. Output quality is fine, it offers the best cloud support around and the high-capacity ink pack could keep you going for years.

**$329, brother.com**

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on new gear at
**getprice.com/au**

## Wireless routers

### Asus RT-BE92U

A premium, consumer-grade Wi-Fi 7 that doesn't cost the Earth. The Asus RT-BE92U doesn't put a foot wrong. It's fast, feature-packed and it even looks good too. At $424 it's also excellent value and is our new Editor's Choice.
**$424, rog.asus.com/au**

### Netgear Nighthawk RS100

Don't be put off by the low price – the RS100 gives you a very viable Wi-Fi 7 service, without making you pay for high-end features and performance you don't really need.
**$199, netgear.com/au**

### TP-Link Archer BE550

This is a brilliant mid-range choice thanks to a 6GHz radio and five 2.5GbE ports – you'll enjoy superb wired and wireless performance, and it even comes with a wide set of features. It's priced well and looks fabulous
**$398, tp-link.com**

## Mesh Wi-fi

### TP-Link Deco XE200

There are cheaper Wi-Fi 6E meshes, but the XE200 wins for its superb download speeds, excellent coverage and the fact that older clients reap benefits of 6E, not just new ones. And a two-pack should be enough for most premises.
**$1,299 (2-pack), tp-ink.com**

### TP-Link Deco X20

The Deco X20 makes it possible to upgrade your home network to Wi-Fi 6 for the price of some standalone routers. The HomeCare functions are also a great bonus for households where lots of devices are fighting over the bandwidth. **$227 (2-pack), tp-link.com**

### Asus ZenWiFi AX

The interface and design certainly aren't the prettiest (the charcoal version is straight out of the 1980s), but if you're after strong performance, great features and plenty of expansion potential, the ZenWiFi AX is a compelling prospect.
**$939 (2-pack), asus.com/au**

## NAS servers

### Asustor Nimbustor 4 Gen2 AS5404T

A particularly strong choice as a media server, the updated Nimbustor 4 is both flexible and quick. Asustor's Nimbustor 4 AS5404T is a four-drive NAS enclosure aimed at demanding home users or small offices.
**$879, asustor.com**

### Synology DiskStation DS925+

Casual NAS users will find better value elsewhere. However, access to the vast, polished and professional Synology ecosystem will more-than justify the high price to buyers who make use of it.
**$1,099, synology.com**

### Qnap TS-264

The Qnap TS-264 is aimed at those who want a bit more from a traditional two-bay NAS. It's effectively the two-bay version of the excellent four-bay TS-464, and provides strong speeds over its pair of 2.5GbE ports – and includes two M.2 NVMe slots.
**$729, qnap.com**

## Security software

### Avast Ultimate

Buy from retail and this is a bargain, with a solid VPN, anti-tracking software and handy detection fees on top of excellent protection.
**~$65, 1 device, avast.com/en-au**

**THE ALTERNATIVES**

**G DATA TOTAL PROTECTION**
Despite its quirks, G Data provides straightforward, effective and inexpensive protection against malware and other threats to your system. **1 device, US$50, avast.com**

**AVAST ONE ESSENTIAL**
Essential has the same malware-detection engine as our top choice, but for free. It even includes 5GB of VPN services per month and a few system optimisation tools.
**Free, avast.com**

### NordVPN

NordVPN provides consistent and fast speeds, serious security, great support for video-streaming services and some cost-effective subscription rates.
**$59 per year, nordvpn.com**

**THE ALTERNATIVES**

**PROTONVPN**
ProtonVPN provided one of the best free offerings of all the VPNs in our group test, including unlimited data, but upgrade to benefit from even faster speeds and many more options.
**Free, protonvpn.com**

**SURFSHARK**
A strong rival to NordVPN, especially if you're willing to commit to its two-year contract. It's fast, cheap and a fine choice for people who like to switch to US streaming services.
**$79.61 for one year, surfshark.com**

### Bitwarden

Bitwarden has a huge advantage: it's free. It isn't as slick as some paid-for rivals, but it can sync passwords across all devices for no extra charge. **Free, bitwarden.com**

**THE ALTERNATIVES**

**DASHLANE**
A manager that's ideal for beginners, and it even builds in an unlimited (if basic) VPN service. Note you may prefer to buy the Family plan ($60 per year) as this extends the service to six people.
**$55.99 per year (Premium), dashlane.com**

**1PASSWORD**
1Password is targeted at users who are looking for the last word in security. It even offers a Travel Mode that may ease your mind if surrendering your phone to customs officials.
**$54.99 per year (individual), 1password.com**

# Market Watch

Mark Williams spotlights representative PCs in the market today.

**PRICE** $1,399 **WEB** tinyurl.com/APC552msy

## MSY G5 59387

Relying on the venerable AM4 socket to provide a 6-core CPU that's still reasonably effective today in new game titles, this'll get your PC gaming adventures started at a reasonable price. While you can upgrade the CPU later, being on an outdated platform means your options for transformative upgrades and ultimately longevity will be limited.

The GPU is a bit more recent, though still entry-level, offering around RTX 5050 levels of performance (ignoring ray tracing). So 1080p should be your target resolution.

32GB is simply lovely to see at this price point, with the SSD and PSU also of good capacities. A solid option for those looking to save a penny.

**SPECS** **CPU** AMD Ryzen 5 5500; **Cooler** Cooler Master Hyper 212 Spectrum V3 ARGB; **Motherboard** Gigabyte B550M DS3H AC R2; **Graphics** Asus Dual Radeon RX 7600 EVO OC 8GB; **Memory** 32GB G.Skill Trident Z RGB 3200MHz CL16 DDR4; **Storage** 1TB Kingston NV3 Gen4 M.2 NVMe SSD; **Power Supply** MSI MAG A650BN 650W; Case MSI MAG Forge M100A.

**PRICE** $1,448 **WEB** tinyurl.com/APC552all

## ALLNEEDS AMD 9600X RX580

Pushing the envelope of the budget end, this system gives you the latest AMD socket with the newest 6-core processor in the Ryzen 5 9600X. Bedded in a B650 motherboard with 32GB of RAM and a 1TB SSD, you've an excellent base from which to upgrade and improve.

The graphics card isn't great; the RX 580 is a card from eight years ago! Offering performance around that of the GTX 1650 Super, these days it's pretty dated, though it can certainly get you by in easier indie and esports titles.

It's certainly worth considering if you want to get something now and upgrade the GPU later, or if you'll only be doing a light amount of gaming.

**SPECS** **CPU** AMD Ryzen 5 9600X; **Cooler** Cooler; **Motherboard** MSI PRO B650M-P; **Graphics** RX580 8GB; **Memory** 32GB Predator 6000MHz DDR5; **Storage** 1TB Kingston SNV2S M.2 NVMe Gen4 SSD; **Power Supply** 600W; Case Antec NX200M.

**PRICE** $3,799 **WEB** tinyurl.com/APC552bpc

## BPCTECH KRAKEN POWER MAXIMUS

It doesn't get much better than this for gaming without going crazy. The RTX 5080, while not the best value, is the highest you'd want to go without wasting money. It'll let you do 4K at high refresh rates with that sweet DLSS 4 and raytracing technology. Paired with the fastest gaming CPU means it won't be held back in any way either.

32GB of RAM is perfect. The 1TB SSD may feel constraining for enthusiast gamers, but it's adequate and a second SSD can be easily dropped in. The 1000W PSU is nice as well, giving you plenty of headroom for future upgrades.

An excellent system for those who want the best but don't want to go overboard.

**SPECS** **CPU** AMD Ryzen 7 9800X3D; **Cooler** MSI MAG Coreliquid M240 AIO; **Motherboard** Gigabyte B650M Gaming Plus Wifi; **Graphics** MSI GeForce RTX 5080 16G Ventus 3X OC Plus; **Memory** 32GB Kingston Fury Beast RGB Black 6000MHz CL36 DDR5; **Storage** 1TB Adata Legend 860 PCIe Gen4x4 M.2 SSD; **Power Supply** FSP Hydro G Pro 1000W; **Case** FSP S380.

**PRICE** $4,799 **WEB** tinyurl.com/APC552pc

## PC CASE GEAR NIGHTFALL 5080

Like the BPCTech system, this one packs the RTX 5080 and Ryzen 9800X3D for top-tier gaming. It costs $1,000 more, but it offers a bigger 2TB SSD, a better X870 motherboard, and a larger 360mm AIO cooler, even though performance is similar.

The 360mm AIO enhances aesthetics and reduces noise, mainly for this CPU. The 1TB SSD is a bonus but not the main reason to buy, as SSDs are inexpensive.

The X870 motherboard is the only reason you should consider this system, as it offers extra connectivity like more than the usual number of PCIe slots and USB ports. If you don't need those features, it may not be worth it.

**SPECS** **CPU** AMD Ryzen 7 9800X3D; **Cooler** Phanteks 360mm AIO; Motherboard Asus TUF X870 Plus WiFi; **Graphics** Asus GeForce RTX 5080 TUF Gaming OC 16GB; **Memory** 32GB Team T-Force Delta RGB 6000MHz CL38 DDR5; **Storage** 2TB Team T-Force Z44A7Q M.2 PCIe Gen4 NVMe SSD; **Power Supply** Phanteks AMP GH 850W; **Case** Phanteks NV5S.

YOUR NEXT PC

# BLUEPRINTS

Build the best PC for your budget

BUDGET
ADVANCED
MID-RANGE
NZXT

## KEY

### *Budget build*

Pick these parts if you want to build a new, well-rounded PC for a good price.

### *Mid-range build*

For productivity power and running every new game at 1080p 60fps. This recommended build will see you through.

### *Advanced build*

You're looking for the best PC on the market and superior components. But you still want to spend smart.

# BUDGET BUILD

Enjoy 1080p gaming and most tasks without breaking the bank.

**TOTAL**

**$1,838**

**MOTHERBOARD**

### B760M Steel Legend WiFi

Asrock **$249**

This board is affordable, DDR5 ready, and packed with features, including Wi-Fi support.

**PROCESSOR**

### Core i5 13400F

Intel **$225**

With ten cores, six of them the Performance kind, this Raptor Lake Core i5 is fantastic value and a great all-rounder.

**GRAPHICS CARD**

### Radeon RX 9060 XT 8GB

AMD **$499**

AMD delivers what we need for a 1080p gaming PC at a solid price, at least until even more budget GPU competition arrives.

**COOLER**

### Laminar RM1 (included with CPU)

Intel **Free**

There's room for an upgrade here, but on a budget the included CPU cooler will work just fine.

**MEMORY**

### Fury Beast 16 GB (2x 8GB)

Kingston **$112**

We've made the switch to DDR5 here, as DDR4 is a bit old fashioned in 2025 and cheap kits are plentiful.

**POWER SUPPLY**

### Pure Power 12 750W

Be Quiet! **$179**

This 750W power supply gives you a decent dose of headroom for some future upgrades, from a trusted manufacturer.

**SSD**

### SN7100 1TB

Western Digital **$139**

It's time to ditch SATA and go for an NVMe drive, even for a budget PC. You'll appreciate the extra speed and fast boot times.

**CASE**

### NX200M

Antec **$65**

This Antec will let your components breathe and has space for further expansion and cooling.

**DISPLAY**

### Gaming 27G4

AOC **$164**

AOC make some surprisingly cheap and well-specced little gaming monitors, like this 27in 180Hz 1080p display.

**KEYBOARD**

### C3 Pro Wired

Keychron **$59**

It's actually mind blowing what you can pick up for this little cash: a USB mechanical board that looks lovely.

**MOUSE**

### G305 Lightspeed

Logitech **$69**

Even on a budget you can still grab a fantastic, ultra-rapid wireless squeaker like this one here.

**HEADSET**

### HS55 Stereo

Corsair **$59**

Corsalr's budget wired cans are comfy and have a surprisingly excellent microphone for the money.

**MOUSE PAD**

### MM100

Corsair **$19**

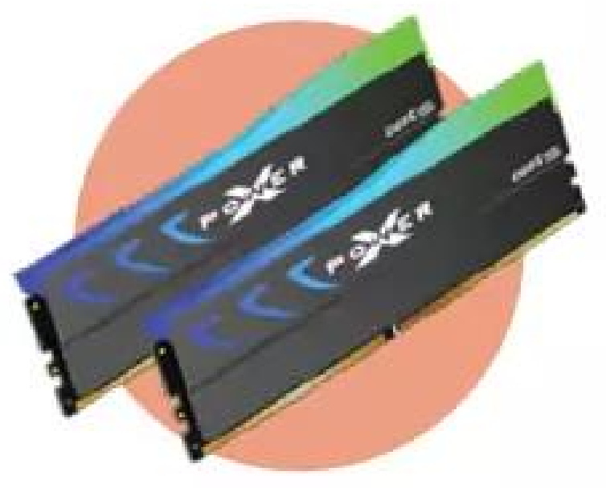
A simple black rectangle that can make a world of difference over no-name models, and it's almost as cheap, too.

# MID-RANGE BUILD

Our recommended build for solid productivity and playing the latest games.

**TOTAL**

**$3,083**

| | | |
|---|---|---|
| MOTHERBOARD | | **TUF Gaming B650-E**<br>Asus **$299**<br>A reliable motherboard with plenty of frills, including Wi-Fi 6E, 2.5Gb Ethernet, PCIe 5.0 for the SSD and USB-C on the back. |
| PROCESSOR | | **Ryzen 7 7700X**<br>AMD **$529**<br>For the longevity offered by the AM5 socket, we're going for AMD's excellent eight-core Ryzen 7. |
| GRAPHICS CARD | | **RTX 5060 Ti 16GB**<br>NVIDIA **$800**<br>Nvidia's RTX 50-series cards have been hard to find for good prices, but this one's widely available, punchy and affordable. |
| COOLER | | **Peerless Assassin 120 SE**<br>Thermaltake **$55**<br>It's a big beast, but it brings cooling performance to the table that's undeniably impressive. |
| MEMORY |  | **XPower Storm DDR5 (2x 16GB)**<br>Silicon Power **$165**<br>A sleek RGB DDR5 kit that gives solid performance for the price, running at 6000MT/s, which is perfect for the CPU in this build. |
| POWER SUPPLY | | **Pure Power 12 M 750W**<br>Be Quiet! **$179**<br>This larger Be Quiet! PSU offers a stable platform with PCIe 5.0 connectivity. At 750W, there's room for a GPU upgrade too. |
| SSD | | **NM790 1TB**<br>Lexar **$119**<br>The Lexar proves you can, sometimes, have it all: blazing speeds, cool operation and a great price. |
| CASE | | **H7**<br>Nzxt **$179**<br>It's very clever of Nzxt to design such an easy PC case to build into, and make it look so gorgeous too. |
| DISPLAY | | **MPG 275CQRXF**<br>MSI **$479**<br>The price of this MSI, considering the 1440p resolution, curve and 240Hz refresh rate, is quite something. |
| KEYBOARD | | **K855 Wireless TKL**<br>Logitech **$119**<br>You could spend more for a full-size keyboard, but this mechanical Logitech will certainly suffice for most people. |
| MOUSE | | **DeathAdder V2 X Hyperspeed**<br>Razer **$59**<br>The regular V2 is great if you can find one, but this version delivers impeccable gaming performance for less. |
| HEADSET | | **Cloud Alpha**<br>HyperX **$140**<br>We're still not over the awesome audio quality and excellent comfort of the HyperX Cloud Alpha. |
| MOUSE PAD | | **G440**<br>Logitech **$27**<br>This low-friction hard-top mouse pad with minimal branding offers the smoothest of glides for a reasonable price. |

# ADVANCED BUILD

Go above and beyond with a PC powerful enough to tackle anything.

TOTAL
$8,857

**MOTHERBOARD**

### MAG X870E Tomahawk

MSU $569

With support for four M.2 drives, huge amounts of DDR5, Wi-Fi 7 and more, this mega mobo is specced to the hilt.

**PROCESSOR**

### Ryzen 7 9800X3D

AMD $889

The top-tier Zen 5 X3D models will have more cores, but for gaming and most uses this is the bee's knees.

**GRAPHICS CARD**

### GeForce RTX 5080

Nvidia $2,500

The RTX 5090 is ridiculously expensive, so we're recommending the RTX 5080 instead, but if you can afford a 5090 go for it.

**COOLER**

### Galahad II Trinity 360

Lian Li $249

Lian Li's Galahad is all about pure liquid cooling performance and it delivers this flawlessly.

**MEMORY**

### Trident Z5 RGB (2x16GB) 6000MT/s

G.Skill $159

This is a new memory standard for a new era of memory speed. DDR5 is blisteringly and fantastically quick.

**POWER SUPPLY**

### Prime PX-1300

Seasonic $499

This PC is a thirsty beast, so you'd better give it a serious power supply – and this one's similarly monstrous.

**BOOT DRIVE**

### NM790 4TB

Lexar $368

With 4TB of storage, it's going to take one seriously big Steam library to get anywhere close to filling this drive up.

**MOUSE PAD**

### Firefly V2 Pro

Razer $169

Do you need an RGB mouse mat? If it makes you feel any better it's excellent for flick shots.

**CASE**

### 5000D

Corsair $189

We swear this stylish mid-tower is bigger on the inside. It's the PC equivalent of the TARDIS.

**DISPLAY**

### ROG Swift OLED PG32UCDM

Asus $2,229

You could be much more sensible on your screen than this. For this build, however, we only want the best.

**KEYBOARD**

### Vanguard Pro 96

Corsair $349

An outstanding typing experience, and packed with features that would make even the most exacting gamer happy.

**MOUSE**

NEW ENTRY

### ROG Harpe II Ace

Asus $239

Its astonishing light weight is pure delight to use for gaming. Some may prefer a heavier mouse for productivity work, though. We love it.

**HEADSET**

### Maxwell

Audeze $499

Planar magnetic drivers make this headset pure heaven for audio fans. And everyone else, to be honest.

# WORKSHOPS & TIPS

Easy-to-follow workshops and expert tips

## WORKSHOPS IN THIS ISSUE

90 Transfer your files from Windows 10 to 11
93 What's the fuss about: Qi2.2 wireless charging
94 Hide AI features in Google search
95 43 AI Tips: Chat privately in Gemini
96 Recover your lost passwords
97 Using keyboard shortcuts to mark emails
98 Stay on top of events
100 Block ads in Safari

# Transfer your files from Windows 10 to 11

Nik Rawlinson is moving everything to Windows 11.

**IT WILL TAKE**
Several hours

**YOU'LL NEED**
Laplink PCmover

**The cheapest way to upgrade from Windows 10 to 11 is to use Microsoft's Windows 11 Installation Assistant, which you can download for free from tinyurl.com/APC552install.**

However, if your computer doesn't support Secure Boot and lacks TPM 2.0, that won't be an option because your hardware will be incompatible with Windows 11. If you're not sure whether your computer supports the newer operating system, download and run Microsoft's PC Health Check program (**tinyurl.com/APC552health**, pictured right).

That said, if your computer is feeling its age, the demise of Windows 10 on 14 October is a great reason to upgrade even if your old PC is compatible. You can buy a new Windows 11 PC for as little as $1,000 and it's likely to be quicker, safer and – aside from any updates – ready to use right away.

But what happens to your existing data? Unless you want to carry on using your old and new machines side by side, you'll need to transfer it to your new PC or laptop. Again, you have two options. One would be to move it directly, either using a high-capacity storage device, like the 256GB Sandisk Ultra Fit stick ($29, pictured below left), which is small and discreet enough to leave permanently connected to your computer.

Another option would be to transfer the data over your local network. Laplink PCmover is designed specifically for this task. The US company behind it, Laplink, has been making data-transfer software since 1983, when you had to connect two machines using either the printer ports or a dedicated communications connector called the serial port.

While you can still physically connect two machines to transmit data between them, it's no longer necessary: now you can do it wirelessly instead. Here we explain how.

### INSTALL LAPLINK PCMOVER

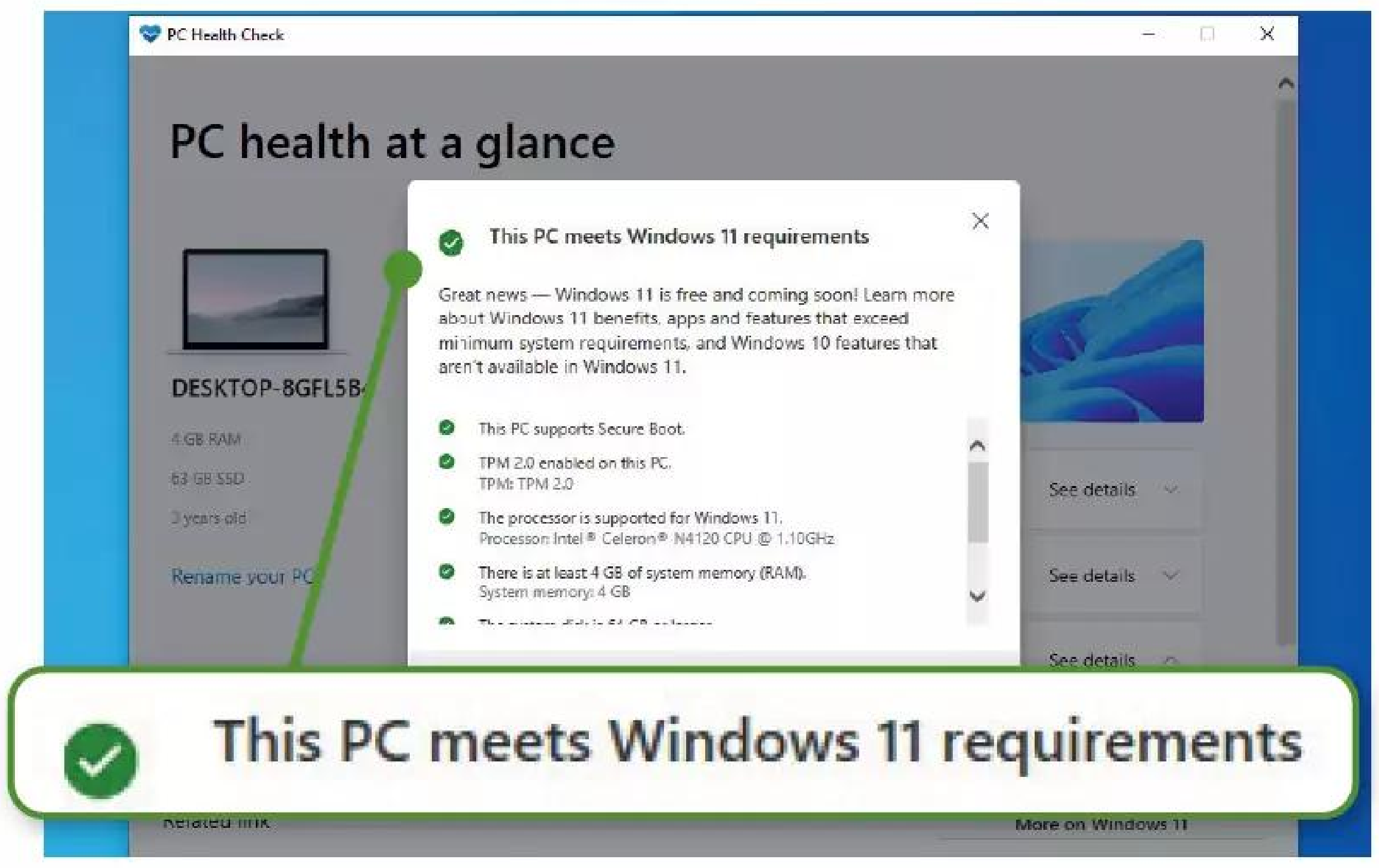
Before transferring data between your computers, you need to make sure that both of them are fully up to date and that there are no Windows Updates pending or reboots required. When we tried to transfer between our two machines, Windows 11 had several updates ready to install, which we had to complete before we could proceed.

To check, open Settings by pressing Windows key+I, then on Windows 10 click 'Update & Security'. If Windows Update isn't automatically highlighted in the sidebar, click it. If any updates are ready, click Download and let them install. While that's working, move to your Windows 11 machine and open Settings in the same way. This time, click Windows Update in the sidebar, and again apply any available updates. Reboot each machine if necessary.

Now, make sure you're sitting in front of your Windows 10 machine.

You'll need a copy of PCmover and a valid serial number to transfer your data. Here we'll be using the Home version of PCmover – see box on page 91 for details of the more advanced Professional edition.

Once you've downloaded PCmover Home, double-click the 'pcmoverh_ml.exe' file in your Downloads folder and follow the onscreen prompts. Click 'Install' in the first window and you'll see a pop-up asking 'Do you want to allow this app to make changes to your device?' Then click Yes.



This PC meets Windows 11 requirements

Great news — Windows 11 is free and coming soon! Learn more about Windows 11 benefits, apps and features that exceed minimum system requirements, and Windows 10 features that aren't available in Windows 11.

This PC supports Secure Boot.

TPM 2.0 enabled on this PC.
TPM: TPM 2.0

The processor is supported for Windows 11.
Processor: Intel® Celeron® N4120 CPU @ 1.10GHz

There is at least 4 GB of system memory (RAM).
System memory: 4 GB

This PC meets Windows 11 requirements

**ABOVE:** Sandisk's 256GB Ultra Fit stick costs only $29 and is big enough transfer your data

**RIGHT**: Microsoft's free PC Health Check program vtells you if your computer can run Windows 11.

## HOW I TRANSFER MY DATA

I've been using Windows 11 for a long time and didn't initially make a huge effort to transfer my data as I store most of it in online storage. Over time, I found I needed to refer to my old data less and less as it became less relevant. I do recognise, however, that one of the reasons I'm so cloud-reliant is that I regularly work with five different machines, two smartphones and a tablet during a typical working day, so I try not to keep everything in one place. That makes me rather different from the average home user.

**Nik Rawlinson**

> "Laplink PCmover is designed specifically for this task. The US company behind it, Laplink, has been making data-transfer software since 1983, when you had to connect two machines using either the printer ports or a dedicated communications connector called the serial port."

Work your way through the installation instructions (we left the settings in their default states, though we did opt out of creating a Desktop shortcut) and, when it's finished, leave the box beside 'Launch Laplink PCmover Home' ticked and click Finish.

Before going any further, you need to turn off all processes on your old PC so they don't interrupt the transfer of your data. Start by quitting any programs that are running, other than PCmover itself. Now open Settings, type screen saver in the search box and click Screen Saver Settings. Click the dropdown menu below 'Screen saver' and select '(None)'.

Close the Screen Saver Settings and, in the Settings search box, type power (1 in our screenshot below). Select 'Power & sleep settings' in the menu that appears. Change all of the settings – for screen and sleep, both on battery power and when plugged in – to Never 2, so that the screen won't turn off and the computer stays awake, even if you don't touch it for a long time.

If either of your machines is a laptop, it'd be a good idea to plug it in at this point, because keeping it awake during this process may run down the battery and you don't want the transfer to fail because it switches itself off.

Now return to PCmover and get started by clicking 'Transfer Between PCs'. Enter your name, email address and serial number. If you're using an Ethernet cable to connect the two computers rather than transferring your data over a wireless network, plug it in to your Windows 10 machine now.

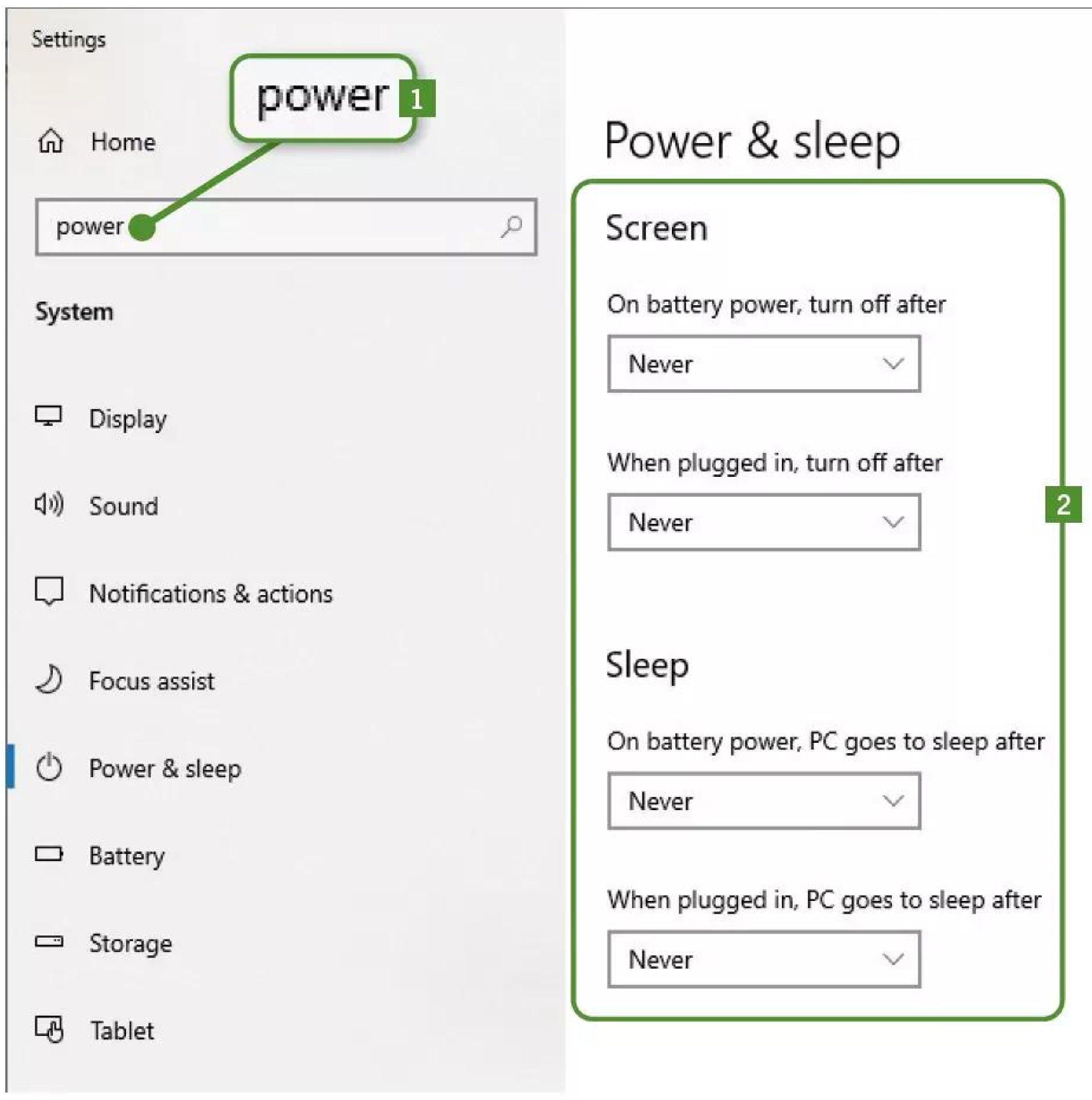
You need to be running PCmover at both ends of the link, whether you're using a physical cable or wireless network, so leave the program running on your Windows 10 machine for the moment, and go to your Windows 11 computer. Now download another copy of PCmover Home. When it's finished downloading, double-click the 'pcmoverh_ml.exe' file in your Downloads folder again and work your way through the installation instructions.

Launch the program and again click Transfer Between PCs. It will once again ask for your name, email address and serial number. You should use the same serial number here as you did on your Windows 10 machine. If your Windows 10 machine is close at hand, you'll be able to see the serial number in the bottom-right corner of the PCmover window.

PCmover should now be running on both computers. If you're using an Ethernet cable to make the transfer, connect the loose end of the cable to the Windows 11 device. If you're transferring the data over your wireless network, make sure both machines are on the same network by hovering over the Wi-Fi icons on their respective taskbars.

If the tooltips that appear don't both display the same network name, click the Wi-Fi icon on Windows 10 and select a new network. On Windows 11, click the Wi-Fi icon, then click the right-hand half of the button above the active network name, and select the same network as you chose on the Windows 10 machine.

Click 'Next' in the PCmover window on both computers. After a few moments they should identify each other and a graphic in each PCmover window will show what it's set up to do. Look at your Windows 10 machine first and make sure that the arrow is pointing from your old machine to the new one (1 in our screenshot above).



power

Screen

On battery power, turn off after: Never

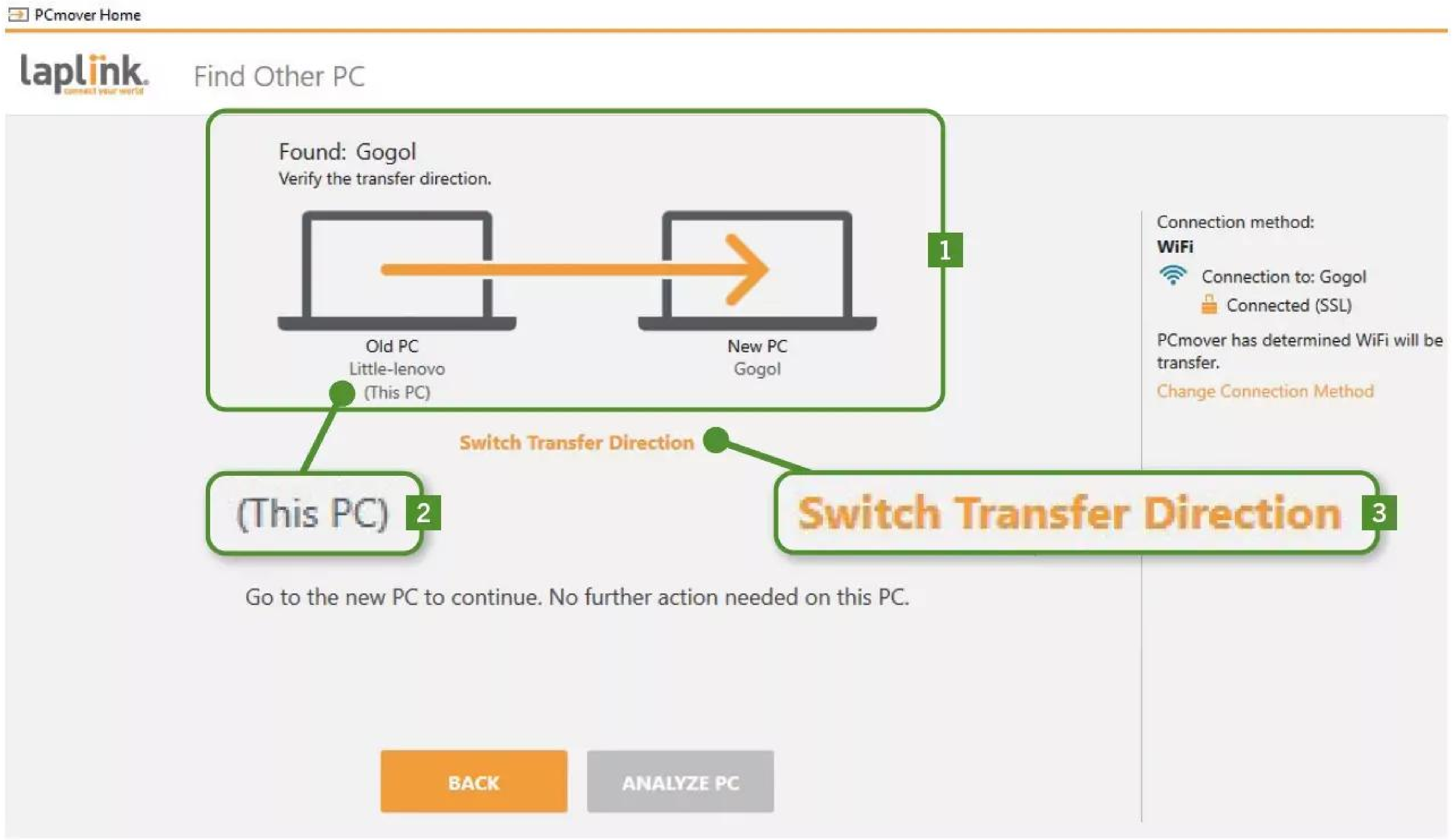
When plugged in, turn off after: Never

Sleep

On battery power, PC goes to sleep after: Never

When plugged in, PC goes to sleep after: Never

Select 'Never' in all the 'Power & sleep' dropdown menus to keep your computer awake during the transfer.


PCmover Home
laplink
Find Other PC
Found: Gogol
Old PC
Little-lenovo
(This PC)
New PC
Gogol
1
Switch Transfer Direction
(This PC) 2
Switch Transfer Direction 3
BACK
ANALYZE PC

Verify the transfer direction.

Connection method: WiFi
Connection to: Gogol
Connected (SSL)
PCmover has determined WiFi will be transfer.
Change Connection Method

Go to the new PC to continue. No further action needed on this PC.

Make sure PCmover is set to transfer data from your old computer to your new one.

You'll know everything is set up correctly if '(This PC)' is displayed below the machine from which the arrow is pointing away 2. Double-check the setting by looking at your Windows 11 machine. Here, the head of the arrow should be pointing at the machine with '(This PC)' displayed below it.

The screenshot above shows what we can see on our Windows 10 machine, which is shown below the tail of the arrow.

If you need to change which PC you are transferring data from and to, click Switch Transfer Direction 3. Be aware that if you set it to transfer from Windows 11 to Windows 10 you will see a warning that you are attempting to perform an unsupported transfer and should customise the transfer to only copy across files, not any other data.

Whichever machine you've been using most recently, you now need to pay attention to the Windows 11 computer. Click 'Analyze PC' and the Windows 11 machine will scan the Windows 10 machine to build a comprehensive list of data that should be copied.

When it's finished scanning, it will be ready to copy across everything required to make your new computer feel like your old one albeit with differences in the operating system (1 in our screenshot below). If you want to customise your transfer, click 'Choose What to Transfer', and you can opt to transfer user accounts, files and settings (but not software 2) or just your files 3.

Whether you want to leave things as they are or make changes to what's transferred, click Next when you're ready to proceed and PCmover will calculate how long the transfer will take. As you can see from our screenshot below, ours will take about one hour based on how much we are transferring and the speed of our network.

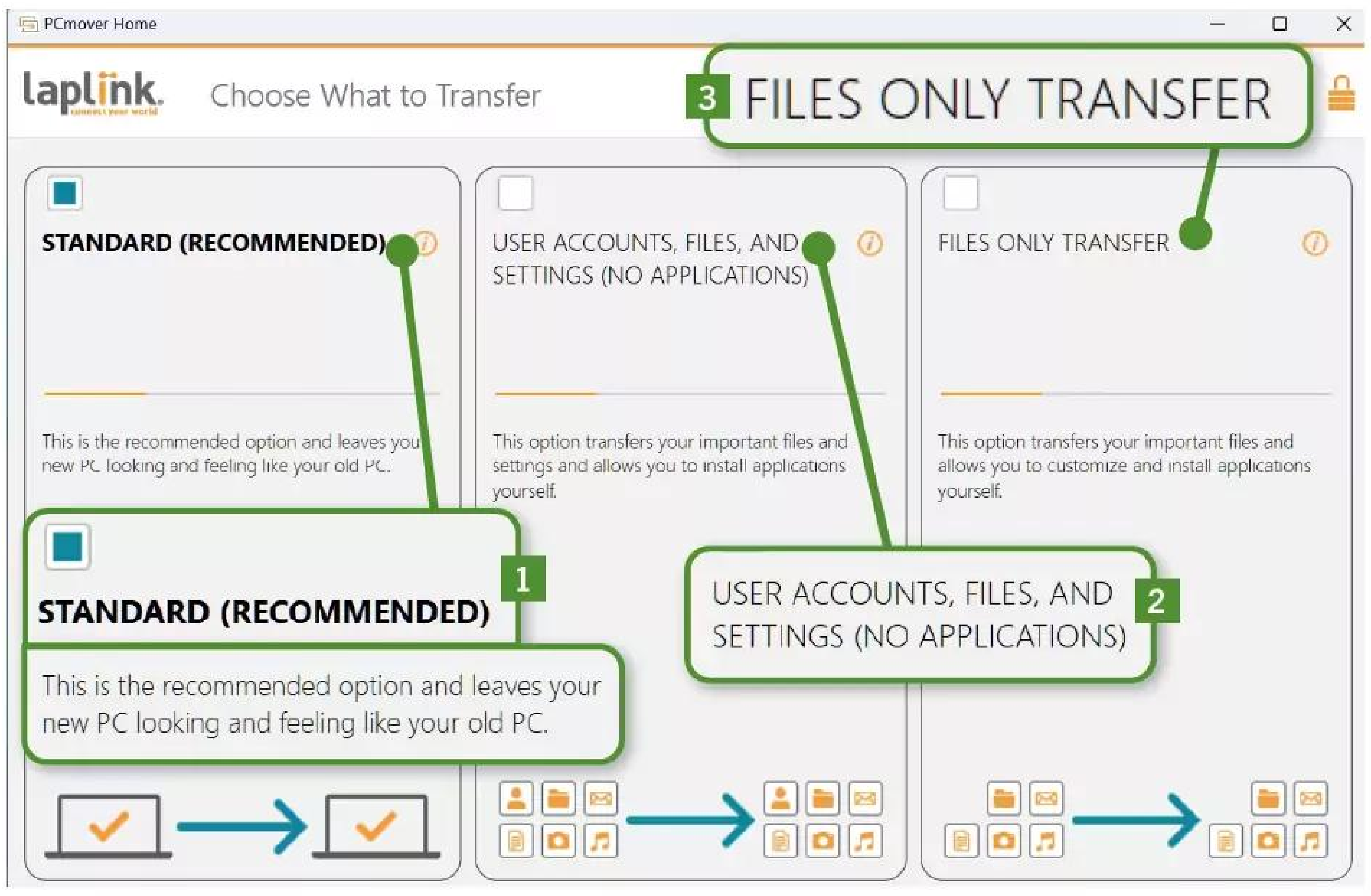
When you're ready, click Start Transfer, then sit back and wait. Ideally, you should avoid using either computer until the transfer has completed because you don't want to end up with an incomplete set of data on either machine. ■

> **"Be aware that if you set it to transfer from Windows 11 to Windows 10 you will see a warning that you are attempting to perform an unsupported transfer and should customise the transfer to only copy across files, not any other data."**

## SHOULD YOU UPGRADE TO PCMOVER PROFESSIONAL?

As its name suggests, Laplink PCmover Home is designed for home users. It can only transfer the files and settings of the user who is currently logged in on the old machine, and only supports a single drive or partition. This means you can transfer from the C: drive on your old machine to the C: drive on your new machine, for example.

PCmover Professional goes further. It can transfer all user accounts from your old PC, copy multiple drives or partitions, and even upgrade from Windows 10 to 11 while keeping your data intact. It also lets you restore a full backup of one PC on to another, which can help if your old computer has suffered a serious crash.

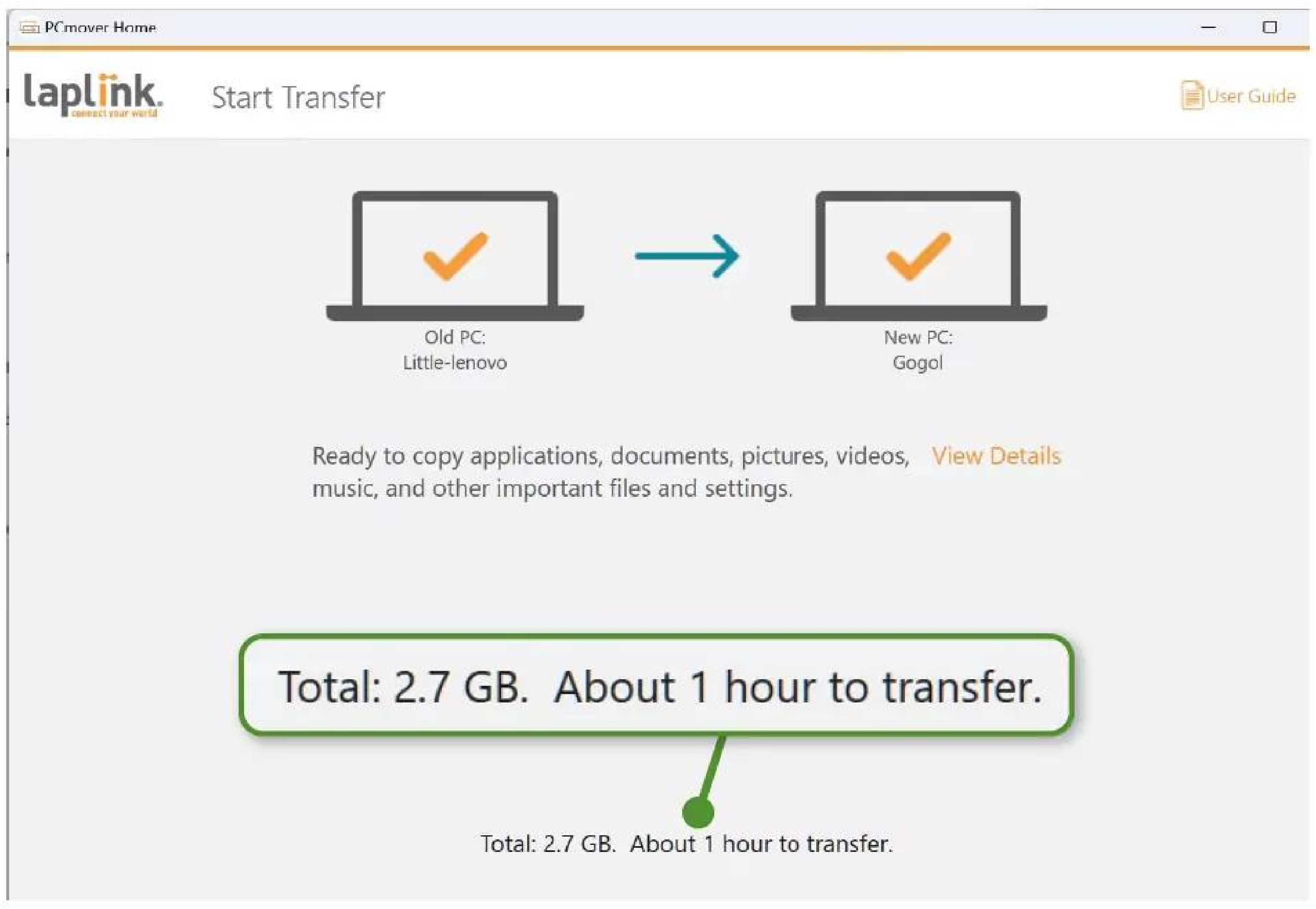

PCmover Home
laplink
Choose What to Transfer
3 FILES ONLY TRANSFER
STANDARD (RECOMMENDED)
USER ACCOUNTS, FILES, AND SETTINGS (NO APPLICATIONS)
FILES ONLY TRANSFER
STANDARD (RECOMMENDED) 1
USER ACCOUNTS, FILES, AND SETTINGS (NO APPLICATIONS) 2

This is the recommended option and leaves your new PC looking and feeling like your old PC.

This option transfers your important files and settings and allows you to install applications yourself.

This option transfers your important files and allows you to customize and install applications yourself.

You can choose to transfer user accounts files and settings, or just your files.


PCmover Home
laplink
Start Transfer
User Guide
Old PC:
Little-lenovo
New PC:
Gogol

Ready to copy applications, documents, pictures, videos, music, and other important files and settings. View Details

Total: 2.7 GB. About 1 hour to transfer.

Total: 2.7 GB. About 1 hour to transfer.

PCmover calculates how long the transfer will take to complete.

### What's the fuss about...

# Qi2.2

Wireless charging should get much faster – but don't ditch your cables just yet.

## What is it?

The latest version of the wireless charging standard Qi (pronounced 'chee'). It was approved in April and the first devices are now starting to arrive.

## Wireless? So you don't need any cables?

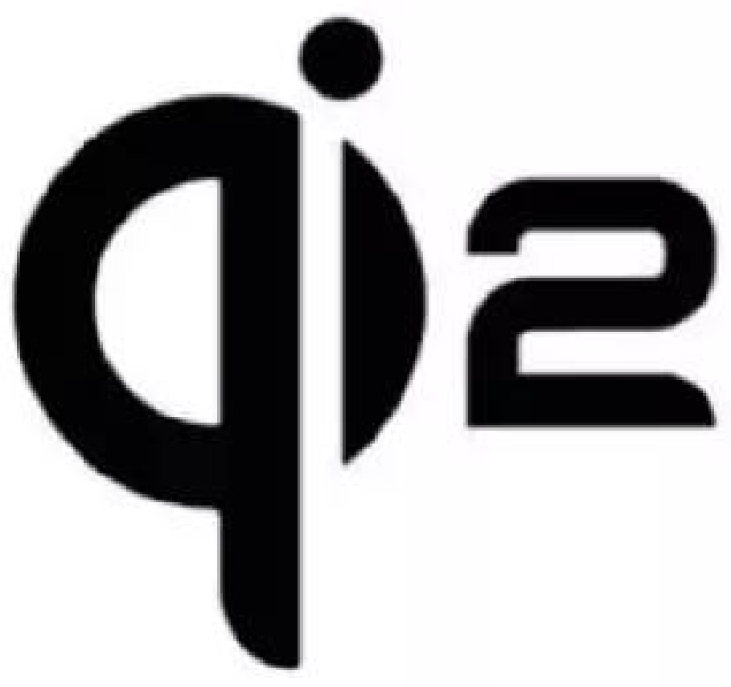
Correct. Wireless charging has been around since 2009 when the Wireless Power Consortium (WPC) introduced Qi. But it took until 2012 for phone manufacturers to make phones that could be charged wirelessly.

## How does it work?

Magnetic induction. Wireless chargers have a coil of wire. When you switch it on, it sends a current through that coil, creating an invisible magnetic field. Your phone has a matching coil. Put the two close enough together, and that magnetic field induces a current in your phone's coil. That current is turned into electricity, which tops up your battery.

## Sounds great. Does it charge faster than cables?

No – and that's held back its uptake. At launch it could only charge at five watts (W), which would take all night to refill your phone's battery. It had reached 15W when Qi2.0 arrived in 2023, but that's still less than half the speed of most wired chargers. It's why many people still prefer to charge their phones with cables. Yet Qi2.2 might change all that.



This logo indicates Qi2.0 and a top charging power of 15W.

## Why? Is it more powerful?

Yes. Qi2.2 raises the maximum to 50W without overheating – fast enough to charge a phone in under one hour.

## But will most chargers hit that speed?

No. Samsung is building a 50W charging processor, but most Qi2.2 chargers won't exceed 25W. That's still a decent increase, however, and should charge phones in under 90 minutes. Just as important is Qi2.2's improved magnetic alignment – inspired by Apple's MagSafe chargers – which uses built-in magnets to ensure your phone and charger line up perfectly every time.

> "At launch it could only charge at five watts (W), which would take all night to refill your phone's battery. It had reached 15W when Qi2.0 arrived in 2023, but that's still less than half the speed of most wired chargers."

## Is that a problem in existing wireless chargers?

Yes. Even placing your phone a few millimetres off can drop charging speeds drastically or stop charging altogether.

That defeats the supposed convenience of wireless charging, which is being able to plonk your phone down and walk away. That's why older chargers often need careful placement or a little 'wiggling' to get a good charge.

## But how is that more convenient than using a wired charger?

Not everyone thinks it is. You still have to find the wireless charging pad, just like you need to find a plug socket with wired chargers. But that's not an issue if the charger is fixed in place – on your desk or bedside table, or in the car – so you always know where it is. And Qi2.0 made magnetic alignment the same across all chargers, making it easier for manufacturers to build devices.

## So can I buy Qi2.2 chargers already?

Well, soon. Ugreen's MagFlow Magnetic Power Bank (pictured above), for example, should be on sale before the end of the year and charges up to 25W. Anker has announced a Qi2.2 version of its popular 3-in-1 Prime stand (above), while Belkin says it's working on "quite a few" Qi2.2 products. And Apple will add support for MagSafe too.

You can check all Qi-compatible chargers on the WPC's site: **tinyurl.com/APC552qi**. There's no new logo for it, but all approved chargers will have the existing Qi2.0 branding (pictured left).

## But presumably your phone would need to be compatible too?

Correct – and very few are. Apple's next iPhones are expected to support Qi2.2 when iOS 26 rolls out this autumn, but it hasn't confirmed this. Android brands like Samsung, Google and OnePlus are tipped to follow. Qi2.2 is backwards compatible so it'll work on older phones, but your charging speed will be limited to what the phone can handle. Wireless will be the future eventually, but you might want to keep some cables handy for now. ■

# Browser tips

Secret settings and best extensions.

FIREFOX

## Convert units in the address bar

As of Firefox 141 (released in July), you can use the browser's address bar to perform unit and measurement conversions. This saves you having to visit a website or ask an AI tool for the answer.

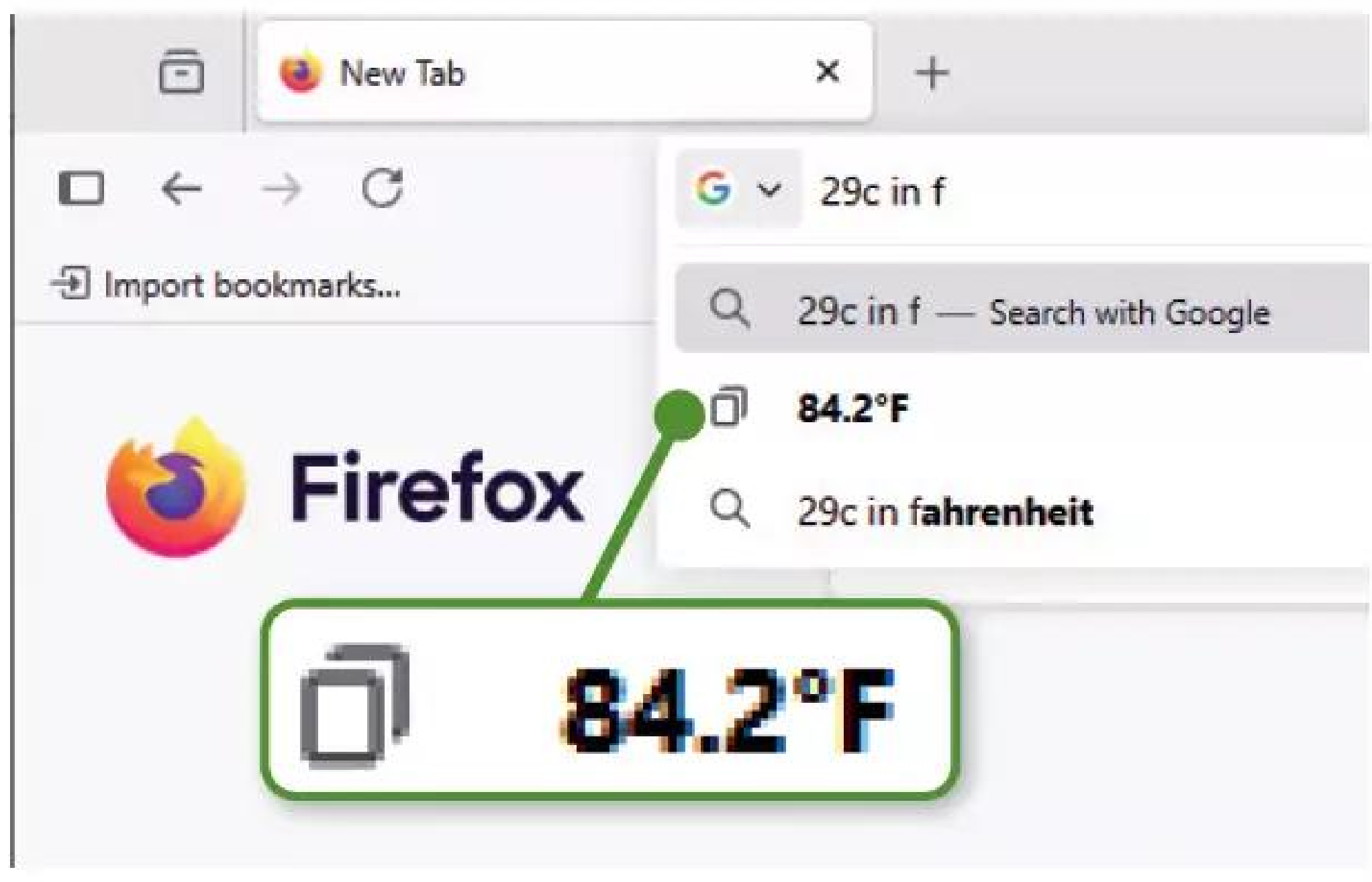
Simply enter a number and the unit types you want to convert from and to, and Firefox will show the result in the dropdown menu below the address bar. Click the Copy button next to it (see screenshot below) to save the figure to your clipboard to paste elsewhere.

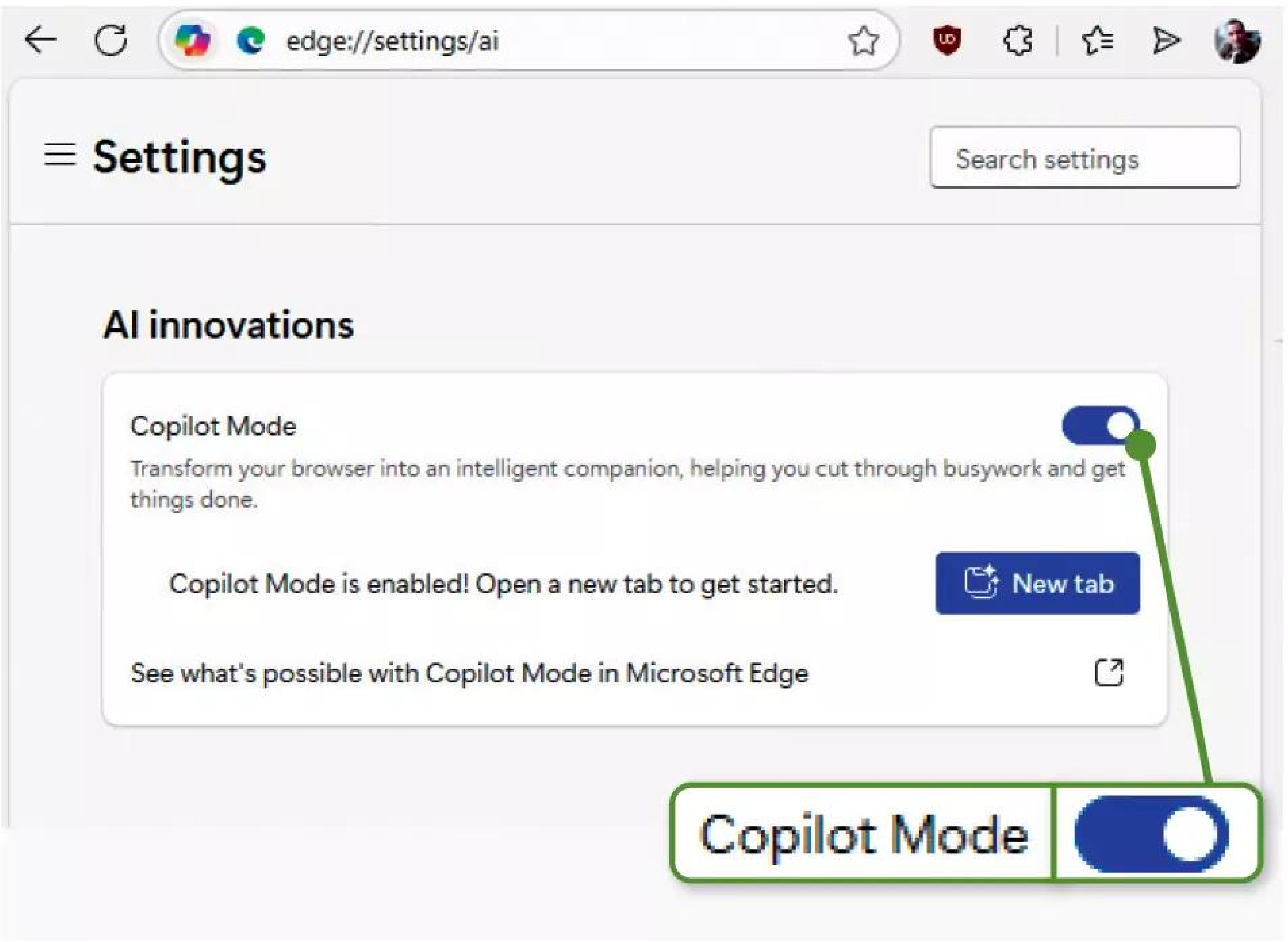
The feature supports temperature, length, mass and angle conversions, and can tell you the time in different time zones. You can also use the address bar to perform simple calculations.

EDGE

## Switch to Copilot Mode more easily

Recently the Edge browser had a new Copilot Mode added, which turns it into an AI-powered browser. It was possible to switch the feature on and off by visiting the Copilot Mode web page (**tinyurl.com/APC552edge**), but Microsoft has now added an easier method. Click Edge's three-line menu button, choose Settings and click the new 'AI innovations' option in the left-hand menu – you can also go straight to **edge://settings/ai**. Switch on the Copilot Mode setting (see screenshot below left) to activate the browser's new AI features and design. Click 'New tab' to get started with Copilot Mode.




edge://settings/ai

AI innovations

Copilot Mode

Transform your browser into an intelligent companion, helping you cut through busywork and get things done.

Copilot Mode is enabled! Open a new tab to get started.

See what's possible with Copilot Mode in Microsoft Edge

Chromium

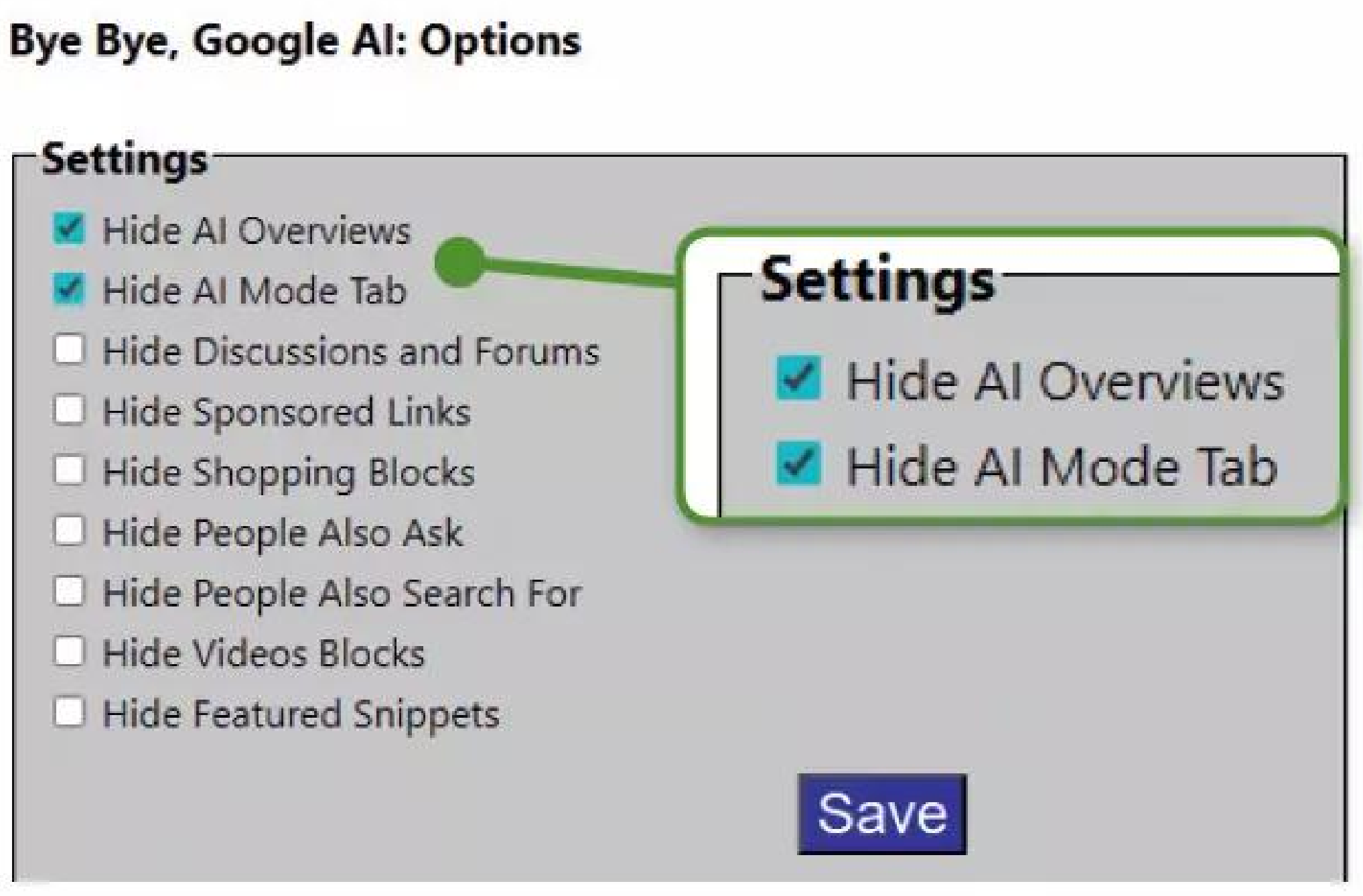
## Hide AI features in Google search

Google's AI Overviews has now been joined by its new AI Mode on search-results pages. These find you relevant information faster by summarising content from multiple sources, but they're not always accurate and you may prefer to visit individual websites.

Google doesn't let you turn off its AI features, even if you never use them, but you can do so using 'Bye Bye, Google AI' (tinyurl.com/APC552byebye). This extension hides AI Overviews and AI Mode from your search results, as well as other annoyances such as sponsored links and 'People also ask' questions.

When you install 'Bye Bye, Google AI', it will open an Options page in a new tab – if it doesn't, click its toolbar button and select Options. Tick the boxes Hide AI Overviews and Hide AI Mode Tab (see screenshot), plus anything else you want to conceal, then click Save.

The AI features will now be hidden from your Google search results. However, the extension can't remove the AI Mode button from the search box on the Google homepage.


Bye Bye, Google AI: Options

Settings

☑ Hide AI Overviews
☑ Hide AI Mode Tab
☐ Hide Discussions and Forums
☐ Hide Sponsored Links
☐ Hide Shopping Blocks
☐ Hide People Also Ask
☐ Hide People Also Search For
☐ Hide Videos Blocks
☐ Hide Featured Snippets

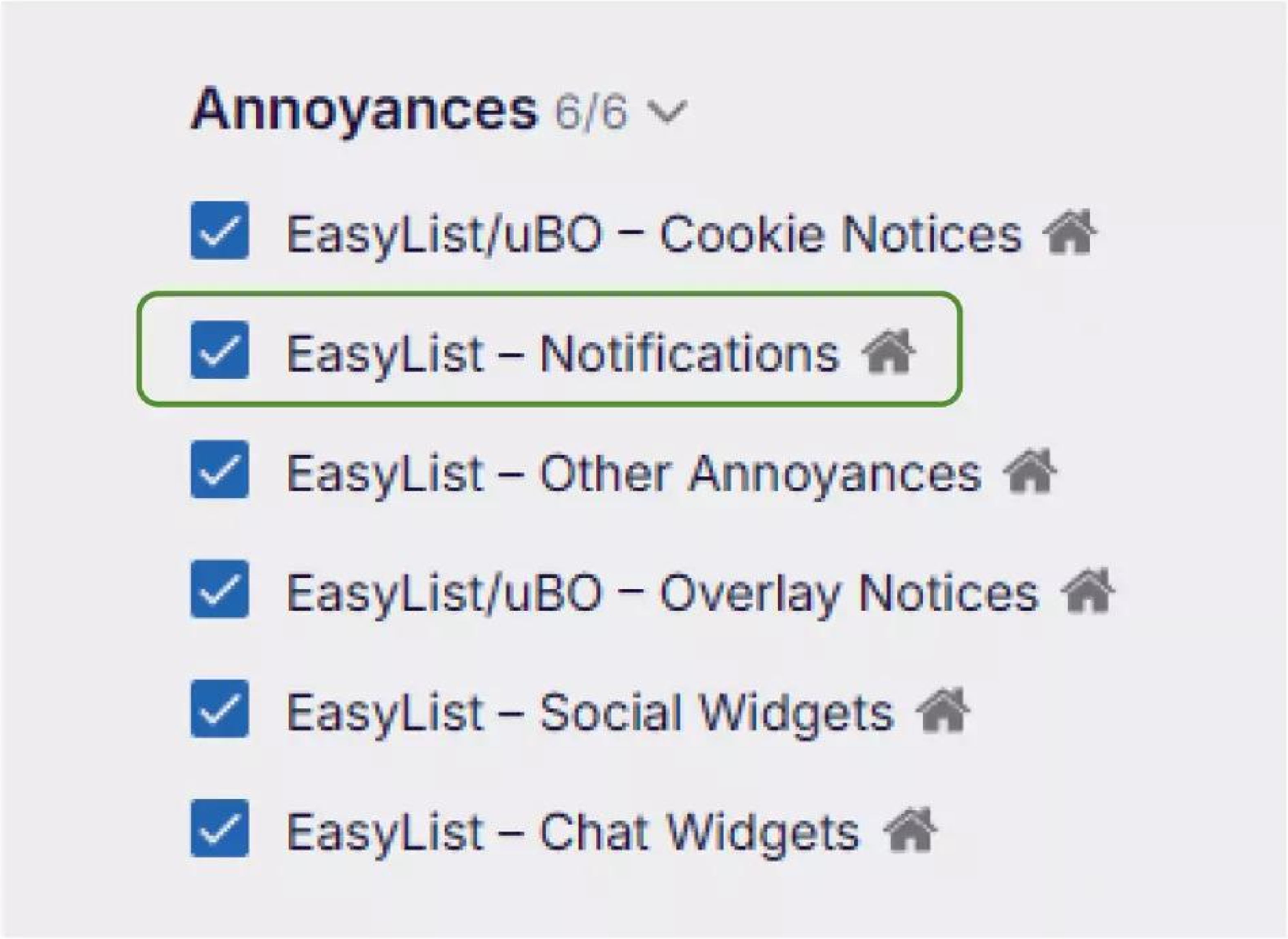
CHROMIUM

## Block website notification requests

Chrome and other Chromium browsers have a setting that's supposed to prevent websites from asking if they can send you notifications. Sadly, it's not completely effective and you may still see the request when visiting sites for the first time.

To stop this happening, you can enable a new filter in the excellent content blocker uBlock Origin Lite (**tinyurl.com/APC552ublock**). Right-click the extension's toolbar button, choose Options and click the 'Filter lists' tab.

In the Annoyances section, select the new option 'EasyList – Notifications' (see screenshot below). This will activate the filter and block notification requests. ■

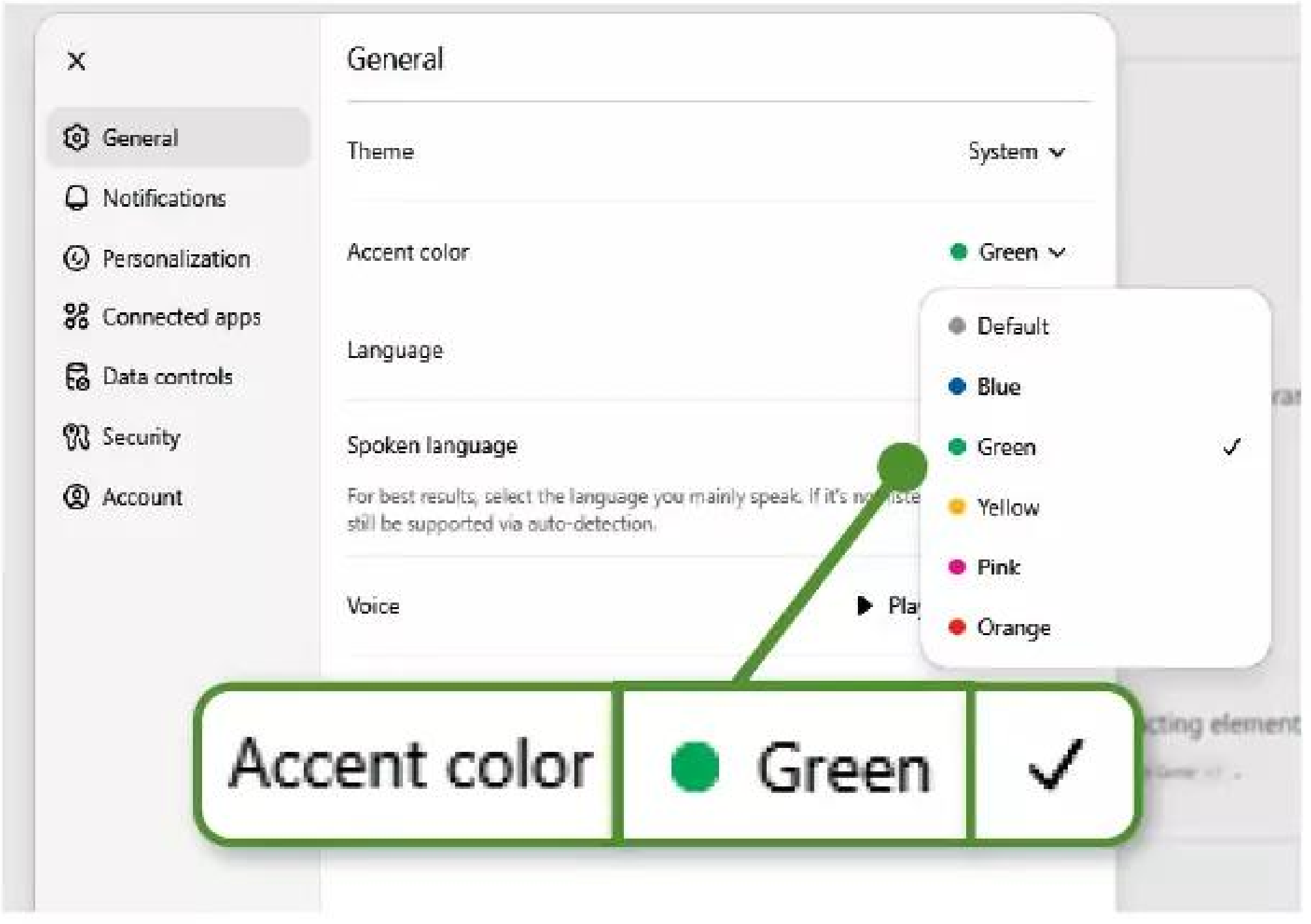

Annoyances 6/6

☑ EasyList/uBO – Cookie Notices
☑ EasyList – Notifications
☑ EasyList – Other Annoyances
☑ EasyList/uBO – Overlay Notices
☑ EasyList – Social Widgets
☑ EasyList – Chat Widgets

# AI tips

Expert tips for a better experience.

NEW IN apc



CHATGPT

## Customise the colour of chats

The new GPT-5 LLM has made ChatGPT faster, more accurate and less prone to 'hallucination'. But aside from the new personality types, most new features added by GPT-5 are currently restricted to paying subscribers.

One new option available to all ChatGPT users makes your chats look more vibrant. It changes the colour of the Send and 'Voice mode' buttons, your message bubbles and highlighted text – from the default grey to blue, green, yellow, pink or orange.

To change the default colour, on the ChatGPT website, click your profile name bottom-left and choose Settings then General. Click the dropdown menu next to 'Accent color' and select your preferred hue (see screenshot above).

In the ChatGPT mobile app, open the left-hand menu, tap your name and choose Personalization, then Accent Color.

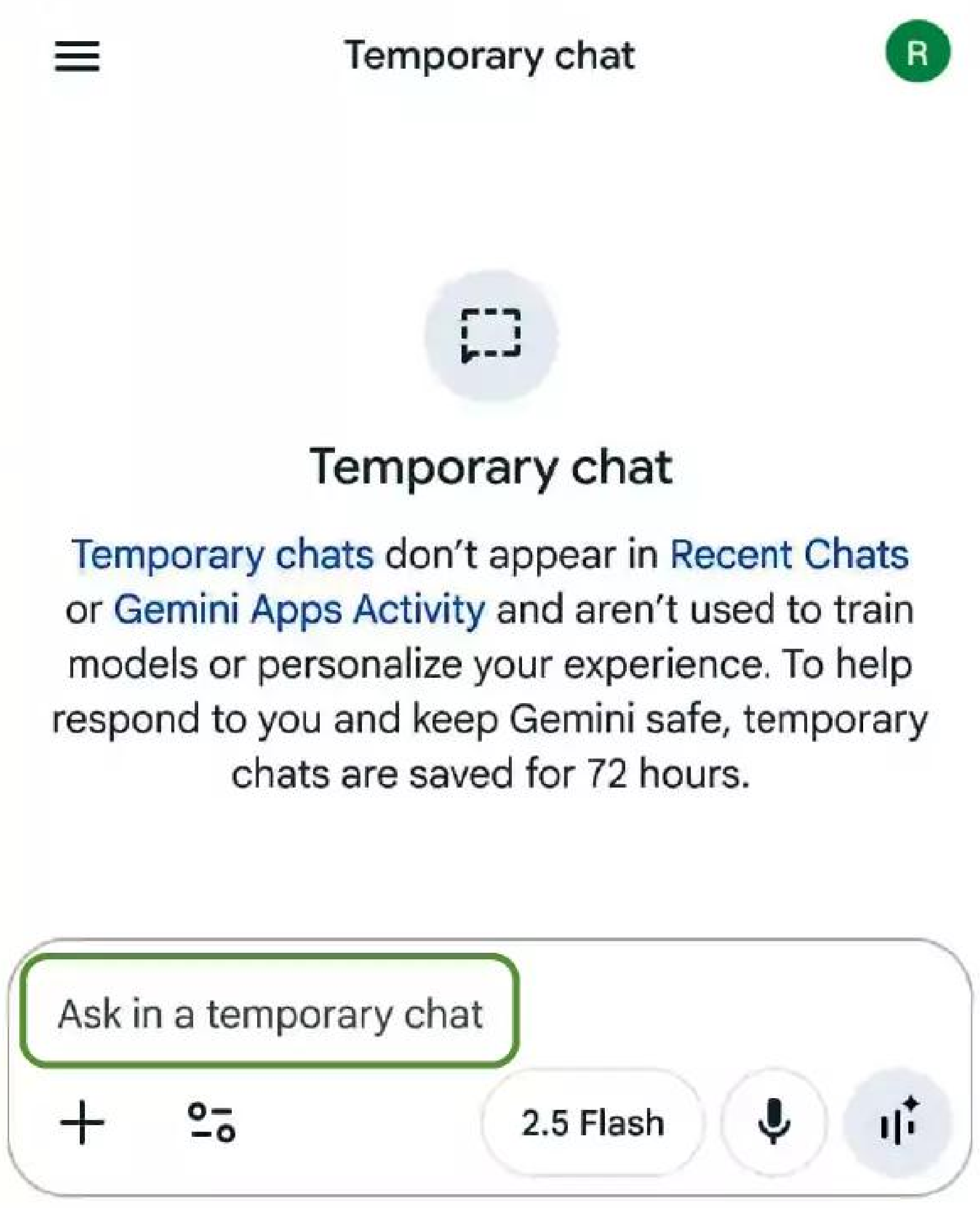
Gemini

## Converse privately in a temporary chat

Google has added a much-requested 'Temporary chat' feature to Gemini, just like the one long available in ChatGPT. This prevents your conversations from being saved to your chat history and used to 'personalise your experience' and train Gemini's language models. It's similar to using incognito or private mode in your web browser.

To start a temporary chat, open the side menu on the Gemini website or in its mobile app, and tap the speech-bubble icon next to 'New chat'. This will switch you to 'Temporary chat' mode where you can talk privately to the chatbot (see screenshot) without the details influencing future conversations.

Google says it will store temporary chats for 72 hours, so Gemini can "respond to you and to process any feedback you choose to provide", after which they'll be permanently deleted.



Temporary chat

Temporary chats don't appear in Recent Chats or Gemini Apps Activity and aren't used to train models or personalize your experience. To help respond to you and keep Gemini safe, temporary chats are saved for 72 hours.

The 'Temporary chat' feature is being rolled out gradually to the Gemini website and mobile apps, so you may not see it yet.

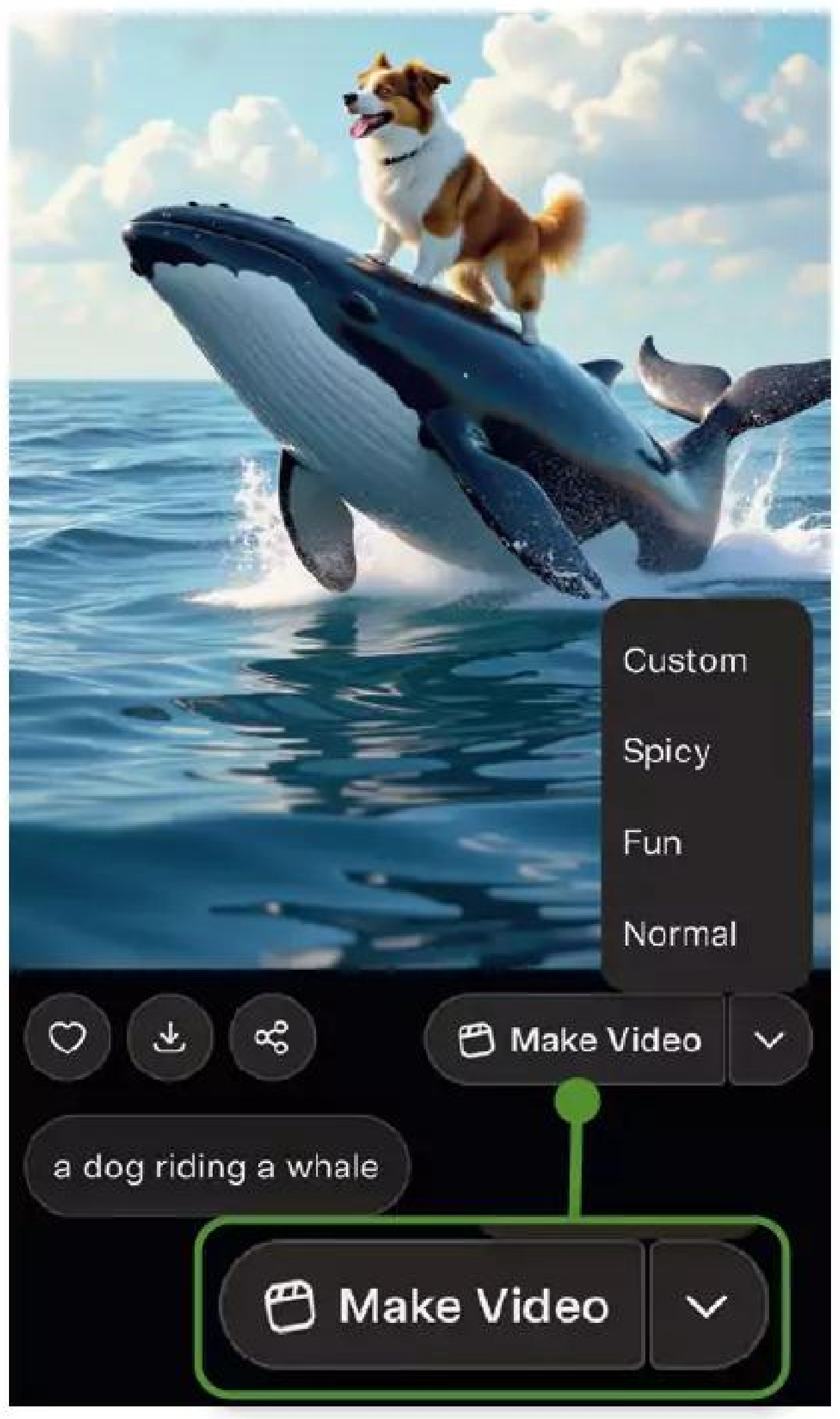
GROK

## Create videos from images for free

Grok's video-generation tool Imagine is now available to all users of its Android (**tinyurl.com/APC552grok**) and iOS (**tinyurl.com/APC552grokio**) app without a subscription. This turns images into short videos – with sound – and is noticeably faster than rival AI video tools.

Open the Grok app, tap the Imagine tab, and either upload a picture or describe one in the 'Type to Imagine' box. With the first option, Grok will automatically animate the still image. With the second, it will produce several image variations to choose from.

Select the picture you want and tap Make Video (see screenshot below left) – choose from styles including Custom, Fun and Normal. Once your video has been created, you can download or share the result.

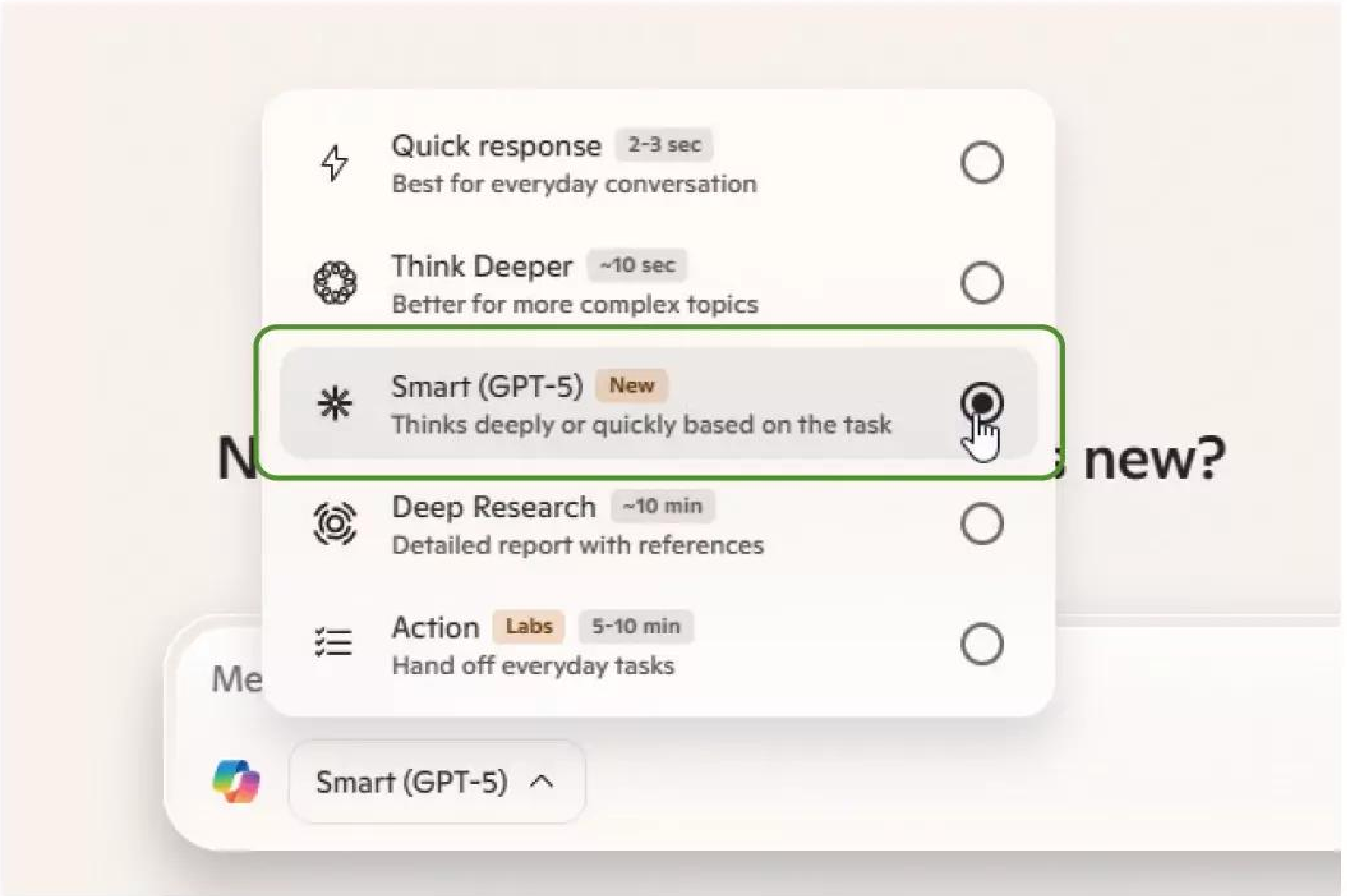


COPILOT

## Get faster answers from Smart mode

Microsoft has brought the new GPT-5 AI model to Copilot in the form of a new 'Smart mode'. This automatically determines whether the chatbot should respond quickly or 'think deeper' based on the nature of the task.

To switch to the new mode, click the dropdown menu in Copilot's message box and choose 'Smart (GPT-5)' (see screenshot below). Enter your query or command and Smart mode will provide 'the best possible solution'. It saves you having to decide between 'Quick response' and 'Think Deeper', and can reduce response times by up to eight seconds. ■



Quick response 2-3 sec ○
Best for everyday conversation

Think Deeper ~10 sec ○
Better for more complex topics

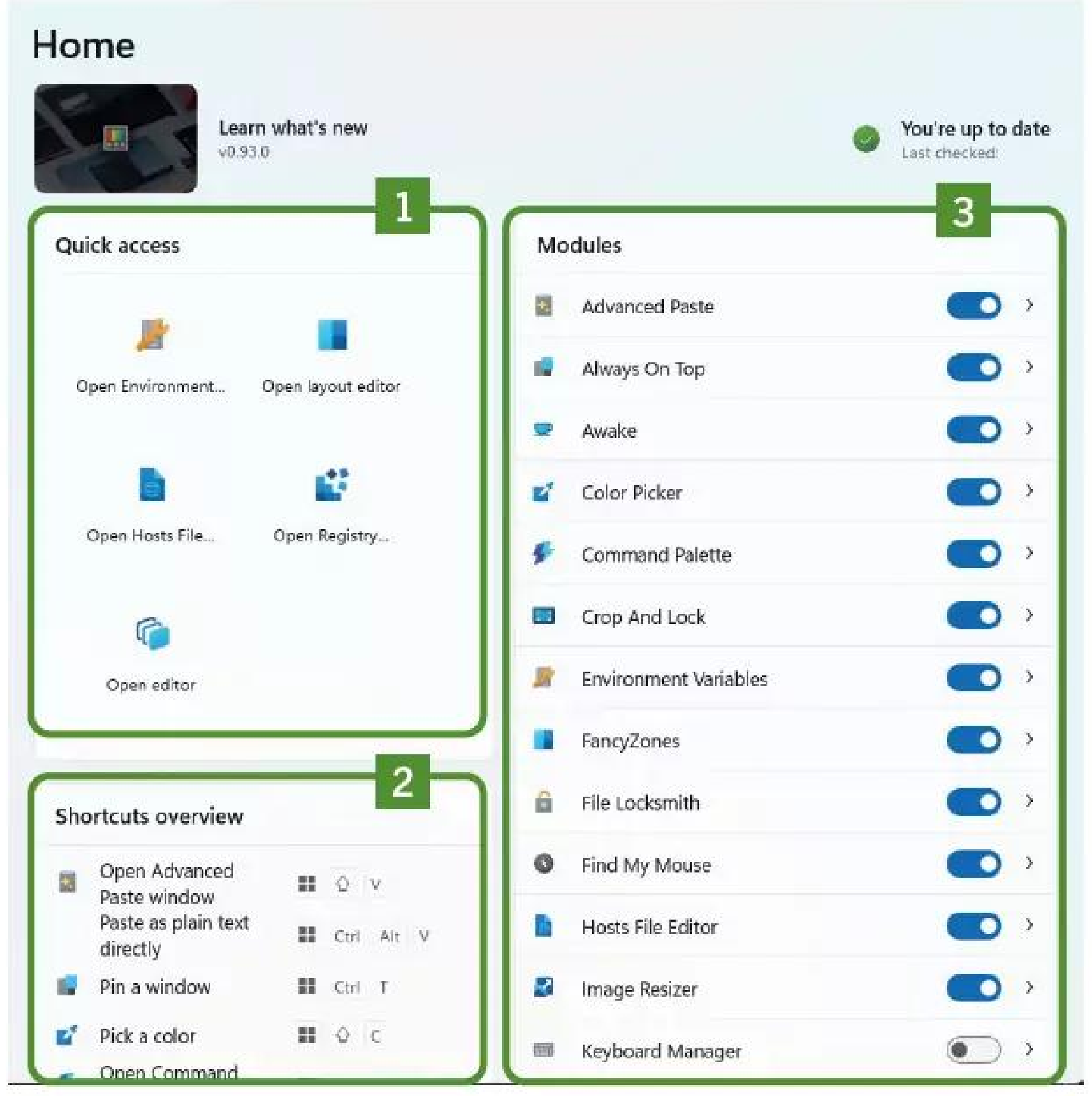
Smart (GPT-5) New ●
Thinks deeply or quickly based on the task

Deep Research ~10 min ○
Detailed report with references

Action Labs 5-10 min ○
Hand off everyday tasks

# Make Windows better

Expert tips for a better experience.


Home
Learn what's new
v0.93.0
You're up to date
Last checked:
1
Quick access
Open Environment...
Open layout editor
Open Hosts File...
Open Registry...
Open editor
2
Shortcuts overview
Open Advanced Paste window
Paste as plain text directly
Pin a window
Pick a color
Open Command
3
Modules
Advanced Paste
Always On Top
Awake
Color Picker
Command Palette
Crop And Lock
Environment Variables
FancyZones
File Locksmith
Find My Mouse
Hosts File Editor
Image Resizer
Keyboard Manager

WINDOWS 10 & 11

## Use the improved PowerToys dashboard

The latest version of Microsoft's PowerToys (0.93) introduces a vastly improved Settings dashboard. On the homepage, there's now a 'Quick access' panel (1 in our screenshot below) providing instant links to useful advanced tools, such as the registry and layout editor. There's also now a dedicated 'Shortcuts overview' 2, to remind yourself of handy keyboard shortcuts. And, most useful of all, the Modules pane 3 provides a quick- glance overview of which PowerToys tools you currently have turned on or off.

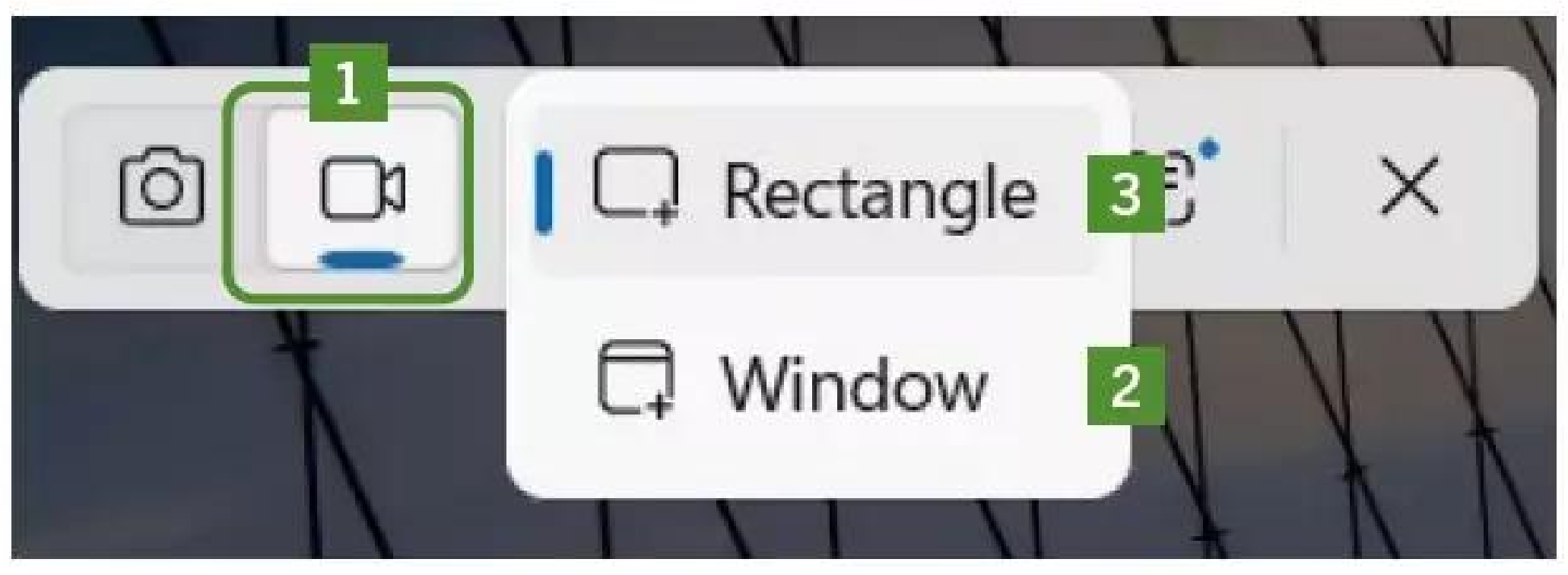
Version 0.93 also has a faster, less resource-hungry Command Palette tool and a new Spotlight mode for the Mouse Highlighter, which dims the entire screen, leaving only the area around your mouse highlighted. If you already have PowerToys installed, you'll be prompted to update it to the new version, but you can also install it by going to **tinyurl.com/APC552toys** and clicking the x64 or ARM64 link, depending on your PC's processor.

WINDOWS 11 INSIDER

## Select a program window when recording in Snipping Tool

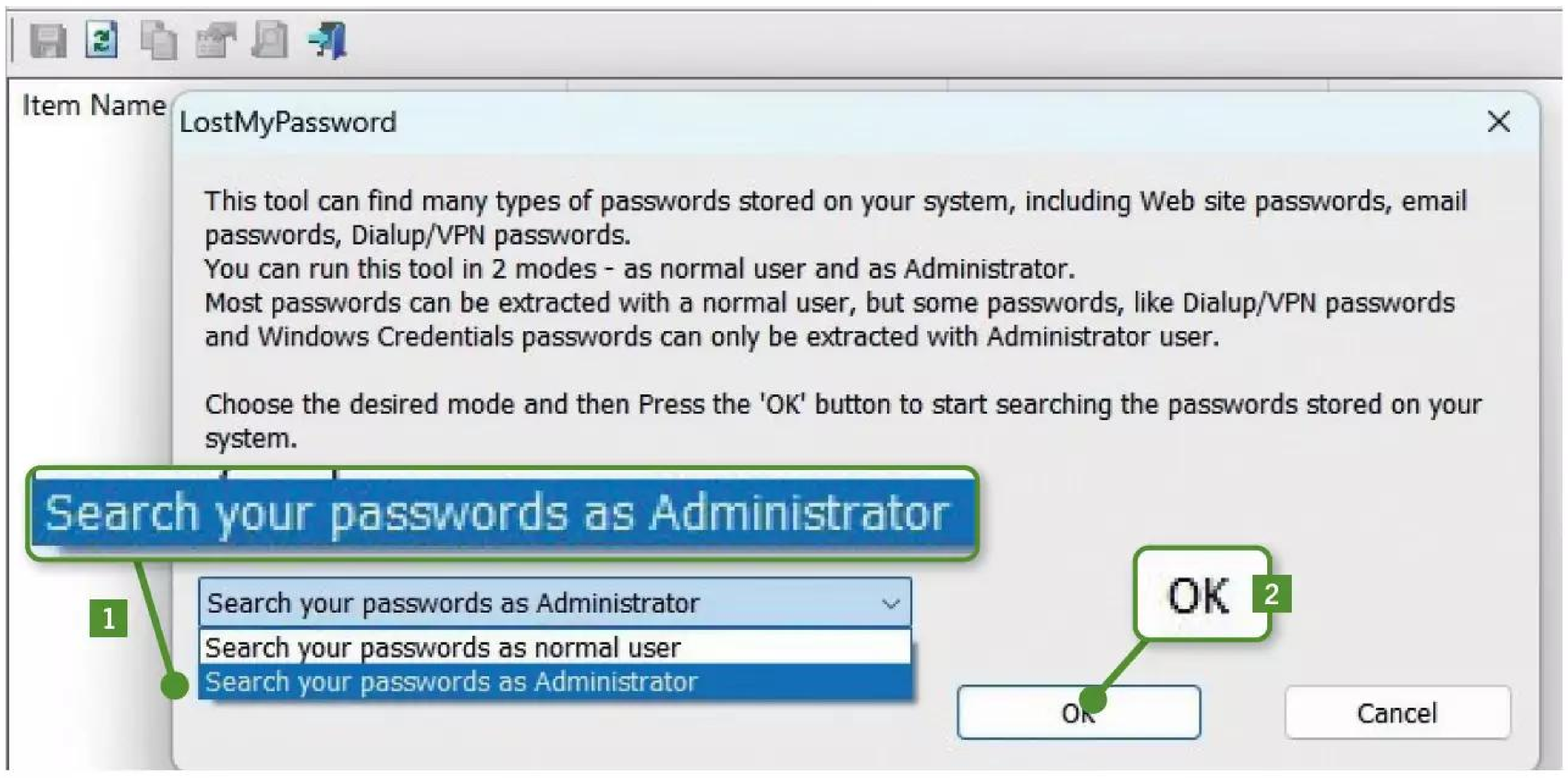
If you're a Windows 11 Insider, you can now select specific areas of a program when recording your screen in Snipping Tool. Microsoft says this gives you a "simple, focused" way to record what's happening in a particular space on your screen, without having to crop later.

Press Windows key+Shift+R to launch Snipping Tool, then click the screen-recording (movie camera) icon (1 in our screenshot below left) followed by the dropdown menu to the right. Now click Window 2 and Snipping Tool will resize the recording region to tightly match the program window you choose. Once recording begins, the region remains fixed. If the program moves or gets covered by another window, the recording won't follow it. There's also a Rectangle option 3 that lets you draw around the section of screen you want to record.


1
Rectangle
3
Window
2

Windows 10 & 11

## Recover your lost passwords


Item Name
LostMyPassword
Search your passwords as Administrator
1
OK
2
Search your passwords as Administrator
Search your passwords as normal user
Search your passwords as Administrator
OK
Cancel

This tool can find many types of passwords stored on your system, including Web site passwords, email passwords, Dialup/VPN passwords.
You can run this tool in 2 modes - as normal user and as Administrator.
Most passwords can be extracted with a normal user, but some passwords, like Dialup/VPN passwords and Windows Credentials passwords can only be extracted with Administrator user.

Choose the desired mode and then Press the 'OK' button to start searching the passwords stored on your system.

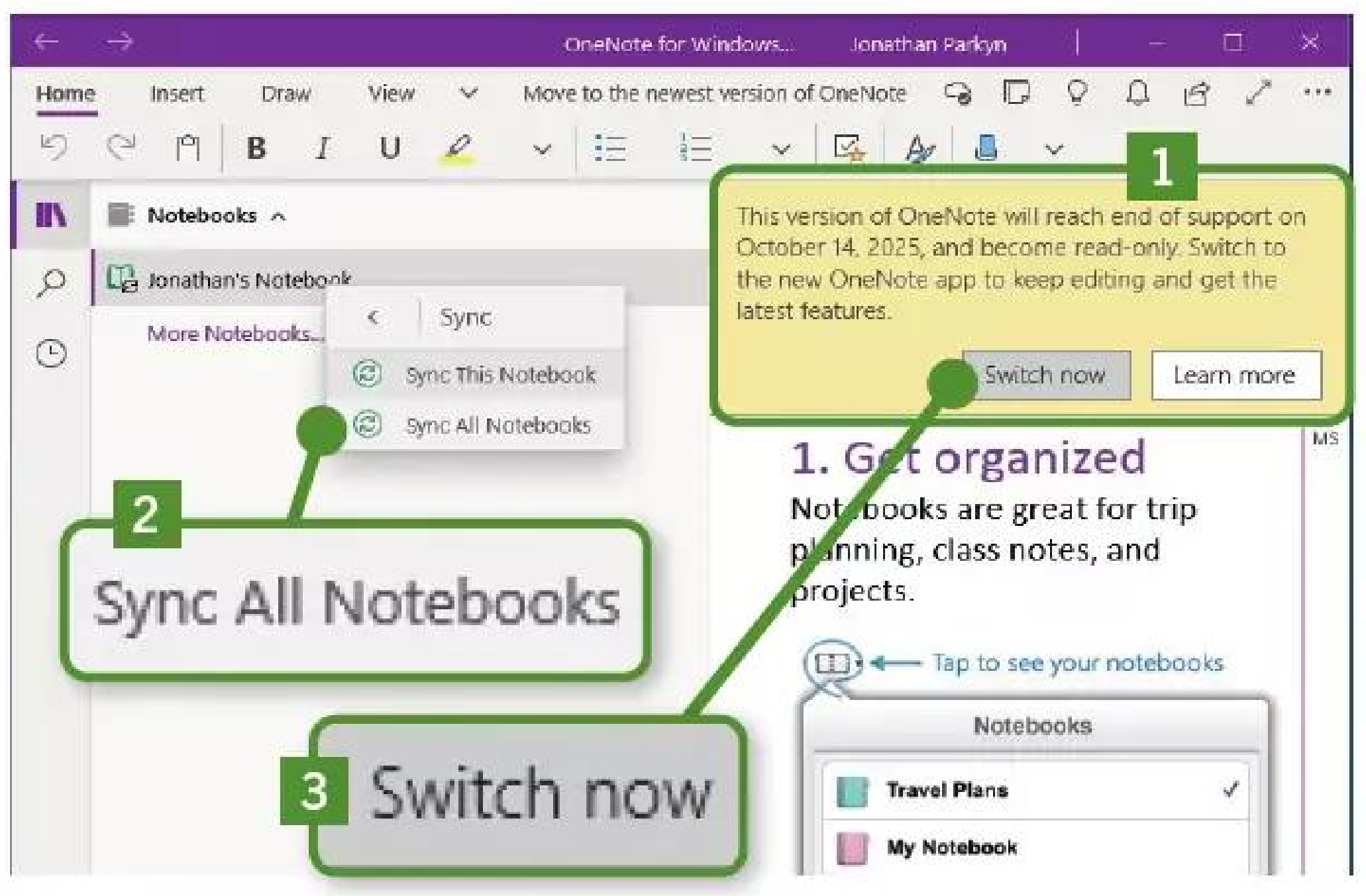
New from one of our favourite independent developers NirSoft, LostMyPassword hunts through your programs – including web browsers – and operating system to uncover all the logins you've saved. To get it, head to **tinyurl.com/APC552lost** and under the Feedback heading click either 'Download LostMyPassword (32-bit)' or 'Download LostMyPassword (64-bit)', depending on your processor. Microsoft Defender might warn that it's unsafe, but this is a false positive.

Once you've downloaded LostMyPassword, extract the ZIP file, then run the 'LostMyPassword.exe' file and select 'Search your passwords as Administrator' (1 in our screenshot)from the dropdown menu (this will uncover more passwords than searching as a normal user). Finally, click OK 2.

WINDOWS 10

## Sync OneNote notebooks before support ends

If you're still using the version of the OneNote app that came with Windows 10, you've probably seen the 'end of support' notification (1 in our screenshot above right) that appears when you launch the tool. After 14 October 2025, the 'OneNote for Windows 10' app will become read-only, which means you'll only be able to view and export your existing notes, not create or edit them.


OneNote for Windows...
Jonathan Parkyn
Home
Insert
Draw
View
Move to the newest version of OneNote
1
Notebooks
Jonathan's Notebook
More Notebooks...
Sync
Sync This Notebook
Sync All Notebooks
Switch now
Learn more
2
Sync All Notebooks
3
Switch now
1. Get organized
Tap to see your notebooks
Notebooks
Travel Plans
My Notebook

This version of OneNote will reach end of support on October 14, 2025, and become read-only. Switch to the new OneNote app to keep editing and get the latest features.

Notebooks are great for trip planning, class notes, and projects.

To carry on using OneNote you'll need to switch to the newer version of the tool, though you must sync your notebooks first. If you don't, you could lose any notes saved on your computer.

First, make sure you're signed into OneNote with your Microsoft account. Now right-click any notebook, then click Sync and select 'Sync All Notebooks' 2. Once syncing is complete, click 'Switch now' 3 in the 'end of support' message and follow the steps to migrate to the new version of the OneNote app (free from **tinyurl.com/APC552one**). ■

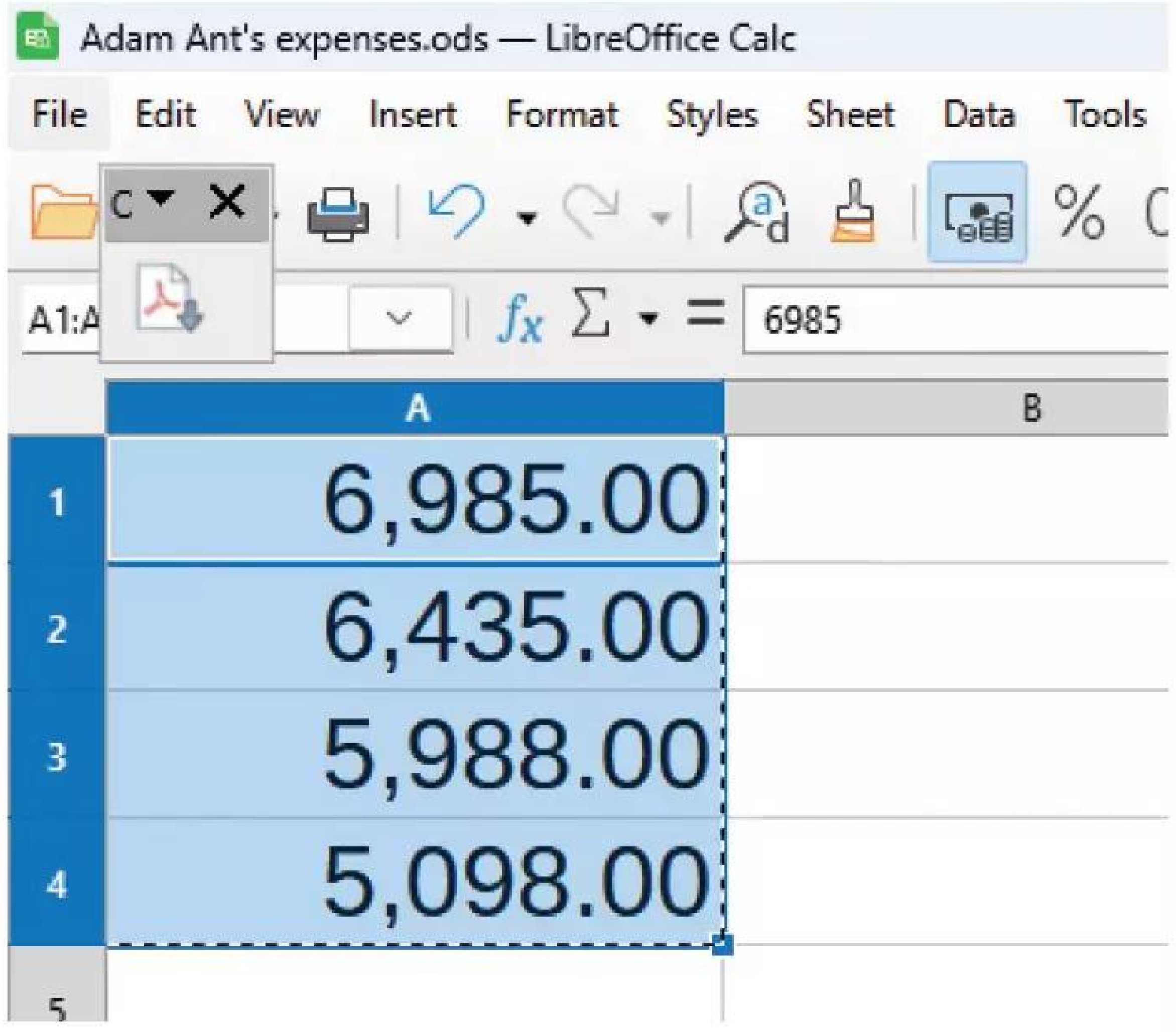
# Make Office better

Expert tips for a better experience.

**LIBREOFFICE CALC & MICROSOFT EXCEL**

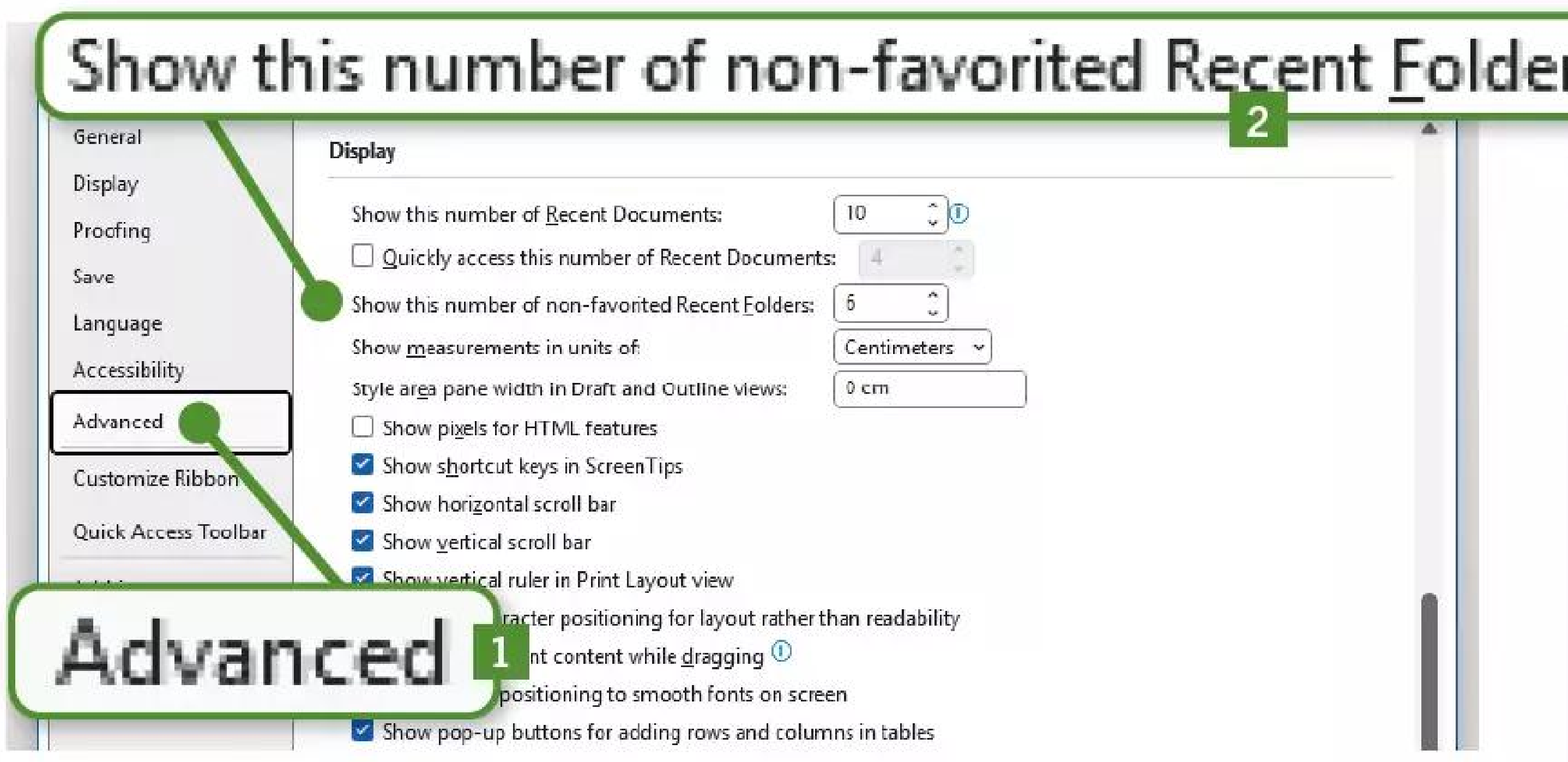
## Turn off 'marching ants' around cells

When you select cells to copy and paste in a spreadsheet, both Calc and Excel indicate them with a moving dotted border – sometimes nicknamed 'marching ants' (see screenshot below). If you find this effect distracting, press the Esc key and it will disappear. Your cells will remain selected though, ready for you to paste wherever you like.


Adam Ant's expenses.ods — LibreOffice Calc

File
Edit
View
Insert
Format
Styles
Sheet
Data
Tools
A1:A
6985
A
B

| | A |
|---|---|
| 1 | 6,985.00 |
| 2 | 6,435.00 |
| 3 | 5,988.00 |
| 4 | 5,098.00 |
| 5 | |


Show this number of non-favorited Recent Folders: 6

Display

Show this number of Recent Documents: 10

☐ Quickly access this number of Recent Documents: 4

Show this number of non-favorited Recent Folders: 6

Show measurements in units of: Centimeters

Style area pane width in Draft and Outline views: 0 cm

☐ Show pixels for HTML features

☑ Show shortcut keys in ScreenTips

☑ Show horizontal scroll bar

☑ Show vertical scroll bar

☑ Show vertical ruler in Print Layout view

racter positioning for layout rather than readability

nt content while dragging

positioning to smooth fonts on screen

☑ Show pop-up buttons for adding rows and columns in tables

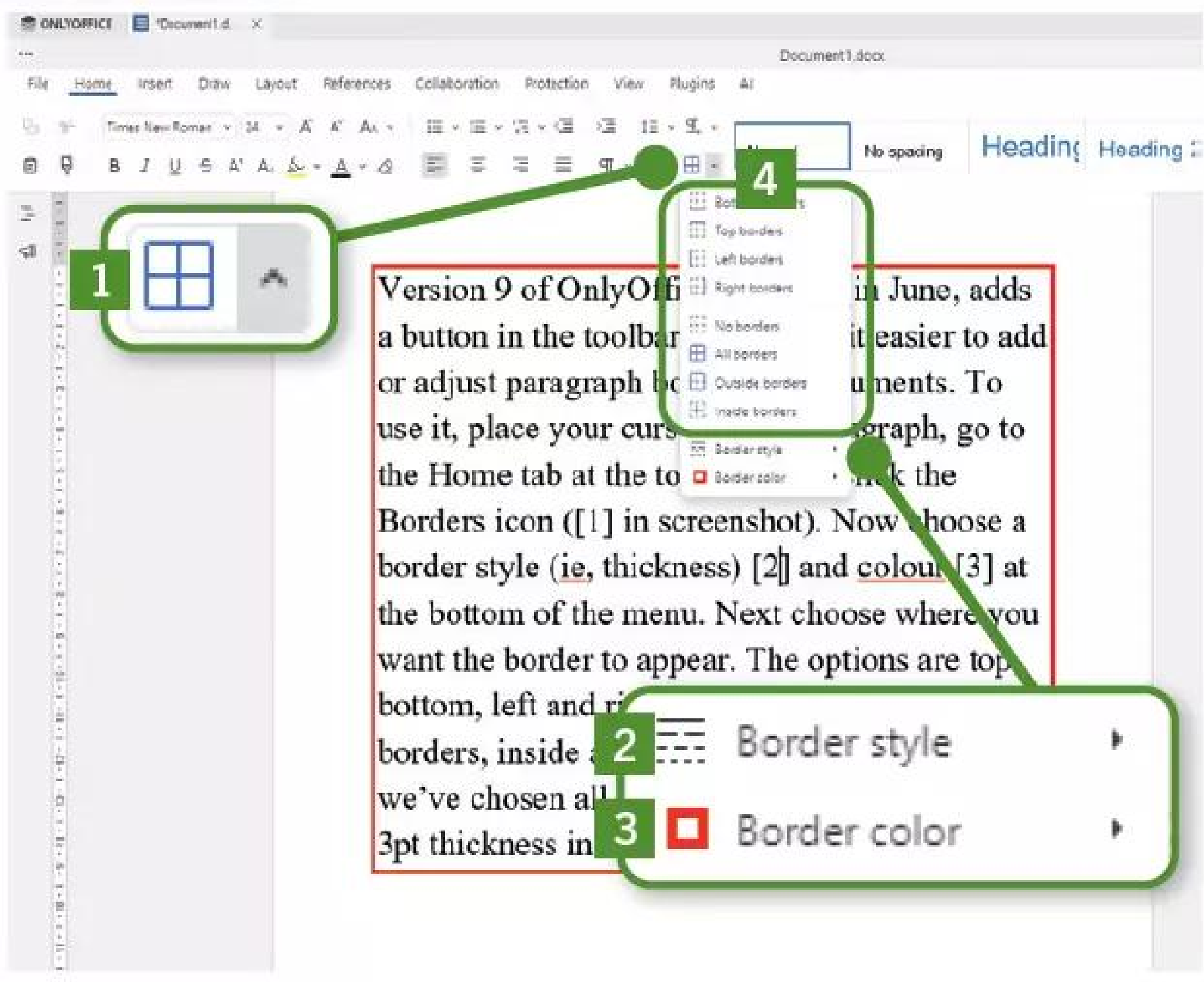
General
Display
Proofing
Save
Language
Accessibility
Advanced
Customize Ribbon
Quick Access Toolbar
Advanced
1
2

**MICROSOFT OFFICE**

## Set how many recent folders you can save to

Microsoft Office lets you pin favourite folders so they're always at the top when you're opening or saving files. You can also right-click a folder and select 'Add to Favorites'.

By default Office also shows the 50 most recent folders you've been working on but haven't pinned as favourites. These are listed under the Older heading when you save a file. If 50 is too many for you, change it by clicking File at the top left, then Options at the bottom left followed by Advanced (**1** in our screenshot above) in the left menu. Now, on the right, scroll to the Display section and choose a number in the 'Show this number of non-favorited Recent Folders' box **2**. Click OK to confirm.


Version 9 of OnlyOffi in June, adds
a button in the toolbar it easier to add
or adjust paragraph b uments. To
use it, place your curs graph, go to
the Home tab at the to k the
Borders icon ([1] in screenshot). Now choose a
border style (ie, thickness) [2] and colour [3] at
the bottom of the menu. Next choose where you
want the border to appear. The options are top,
bottom, left and ri
borders, inside a
we've chosen all
3pt thickness in

ONLYOFFICE
Document1.d
Document1.docx
File
Home
Insert
Draw
Layout
References
Collaboration
Protection
View
Plugins
AI
Times New Roman
14
No spacing
Heading
Heading 2
Top borders
Left borders
Right borders
No borders
All borders
Outside borders
Inside borders
Border style
Border color
1
2
3
4

**ONLYOFFICE**

## Add paragraph borders from the toolbar

Version 9 of OnlyOffice, released in June, adds a button in the toolbar that makes it easier to add or adjust paragraph borders in documents. To use it, place your cursor in the paragraph, go to the Home tab at the top left, then click the Borders icon (**1** in our screenshot above). Now choose a border style (ie, thickness) **2** and colour **3** at the bottom of the menu. Next choose where you want the border to appear. The options are top, bottom, left and right, as well as no borders, all borders, inside and outside **4**. In our example we've chosen all borders, with a border style of 3pt thickness in red. ■

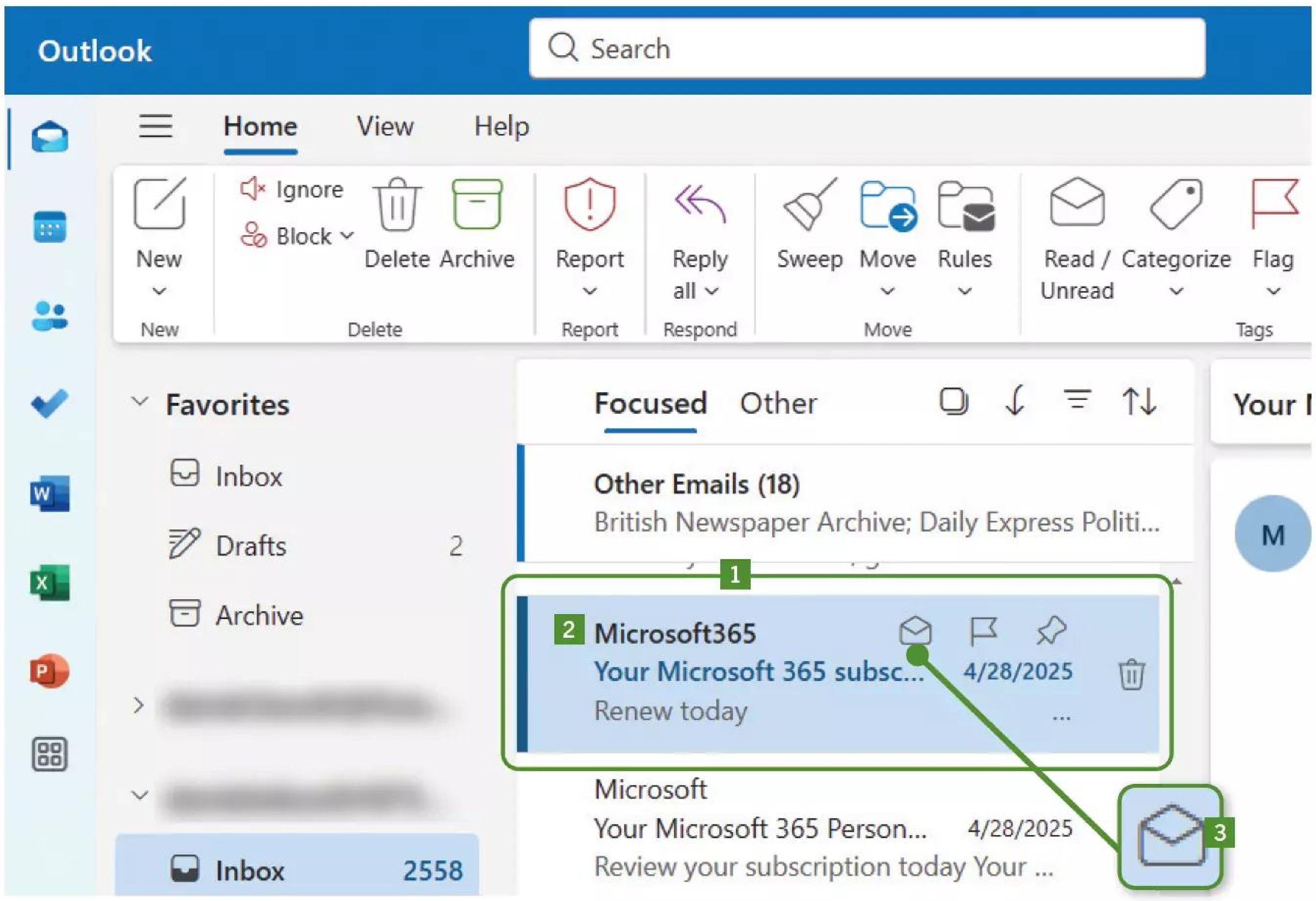
---

**Microsoft Outlook**

## Mark emails as read and unread using keyboard shortcuts.

As you scroll through your Outlook inbox you can use keyboard shortcuts to mark emails as read or unread. This works in both the new and old ('Classic') versions of Outlook.

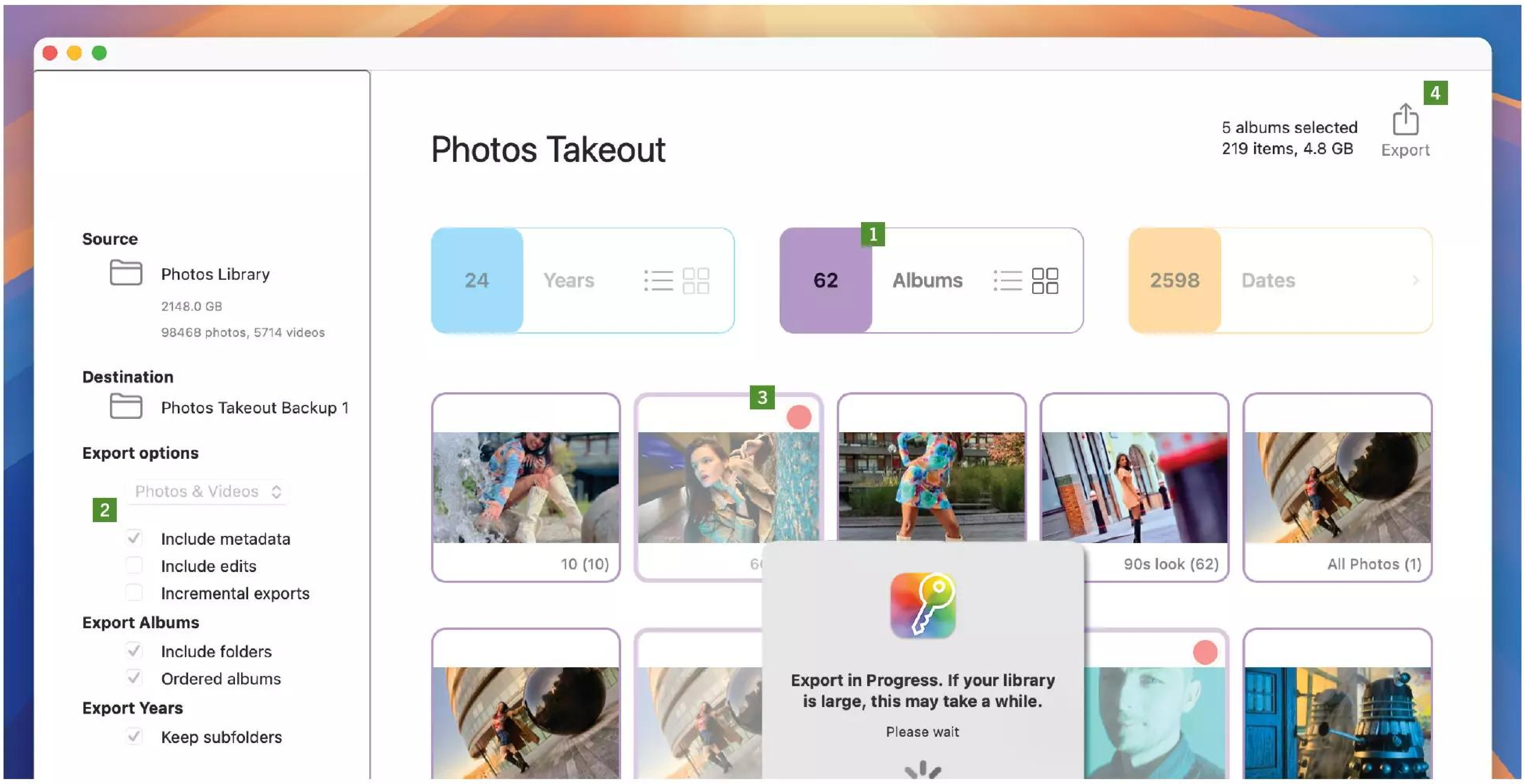
You need to select an email in your inbox so it's highlighted in blue (**1** in our screenshot). Its sender and subject line will be in bold **2**, indicating it hasn't been read. Pressing Ctrl+Q will mark it as read, and the words inside will lose their bold formatting. This has the same effect as hovering your mouse over the email and clicking the envelope icon that appears **3**. Pressing Ctrl+U marks an email as unread and restores the bold formatting.


Other Emails (18)
British Newspaper Archive; Daily Express Politi...

Microsoft365
Your Microsoft 365 subsc... 4/28/2025
Renew today

Microsoft
Your Microsoft 365 Person... 4/28/2025
Review your subscription today Your ...

Outlook
Search
Home
View
Help
New
Ignore
Block
Delete
Archive
Report
Reply all
Sweep
Move
Rules
Read / Unread
Categorize
Flag
New
Delete
Report
Respond
Move
Tags
Favorites
Inbox
Drafts
2
Archive
Inbox
2558
Focused
Other
Your I
M
1
2
3



Photos Takeout

5 albums selected
219 items, 4.8 GB

Source
Photos Library
2148.0 GB
98468 photos, 5714 videos

Destination
Photos Takeout Backup 1

Export options
Photos & Videos
☑ Include metadata
☐ Include edits
☐ Incremental exports

Export Albums
☑ Include folders
☑ Ordered albums

Export Years
☑ Keep subfolders

Export in Progress. If your library is large, this may take a while.
Please wait

**1 VIEWS**
Click Icon view to see Album thumbnails, or choose List view to see folder hierarchies for easier access to specific assets.

**2 OPTIONS**
Check the boxes available here to choose whether to include metadata and/or the edited version of exported photos.

**3 SELECT**
In Icon view, simply hold Cmd, and then click to choose complete albums that you want to export and back up.

**4 EXPORT**
Click here to export selected files from your Apple Photos Library to the Photos Takeout folder on an external drive.

# Easily export your Photos library

Back up your precious pictures while preserving vital information.

**IT WILL TAKE**
15 minutes

**YOU WILL LEARN**
To back up Photos assets by date or album, and ensure original files are backed up

**YOU'LL NEED**
Photos Takeout app (Free, offers IAPs, **photostakeout.com**), macOS 10.13 or later

**By only storing photos locally on your Mac, you risk losing irreplaceable memories if it gets lost or damaged. A safer solution is to store shots on iCloud Photos, as you can simply download the full-resolution images as and when you need to edit and share them. However, although iCloud Photos is a syncing service, it doesn't technically offer a backup of your clips and stills.**

Make sure that your precious pictures are backed up independently of iCloud Photos and your Mac.

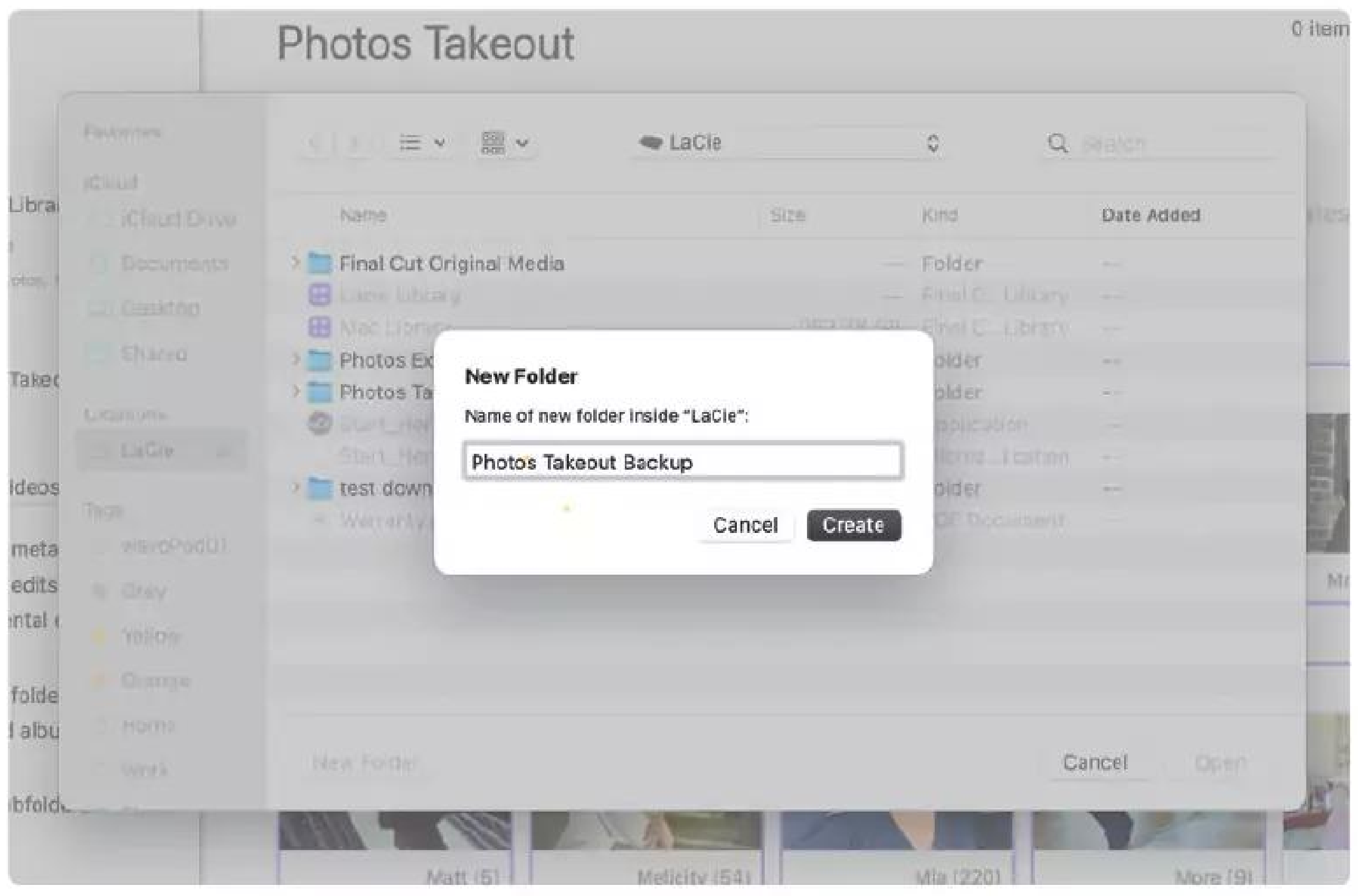
Plus, as you snap more shots, you may need to start paying for extra iCloud storage.

Fortunately, the Photos Takeout app enables you to back up and offload assets such as large video clips, so you can then delete them from Photos and keep your iCloud Photos storage requirements down. The app enables you to quickly export full-resolution images and clips from your Photos Library and store them locally, such as on an external drive, providing you with a backup of your valuable assets.

## SEEK, LOCATE AND BACK UP

Photos Takeout also makes it quicker and easier to locate and export shots. For example, to use Apple's Photos to share a collection of photos taken on a specific day, you need to click the Years tab, double-click to choose a year, then scroll though to find the relevant month, then scroll through thumbnails to find the appropriate day. As each day's thumbnails roll into the next, this makes it hard to find and select a specific day's images. In Photos Takeout, you simply click the Dates tab, scroll to a specific date's thumbnail and then click Export. All the photos from that date will appear in a dated folder in the designated destination folder. Job done. ■ **George Cairns**

# How to Back up from albums and dates

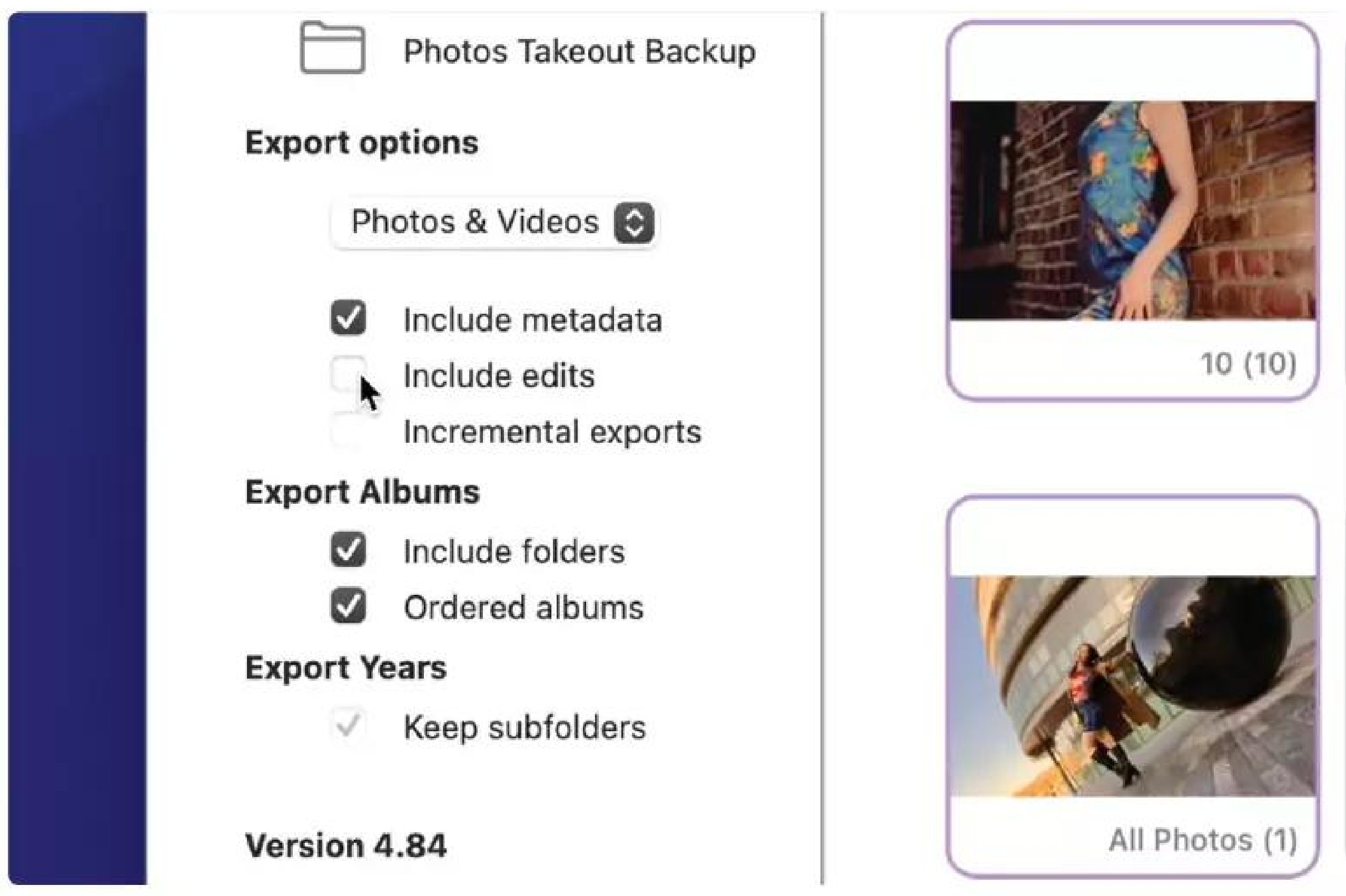


New Folder
Name of new folder inside "LaCie":
Photos Takeout Backup

Photos Takeout
Cancel
Create

## 1 Choose a backup location

Launch Photos Takeout. It will automatically choose your System Photo Library in your Pictures folder as the Source because this syncs with iCloud Photos. Click Destination and create a backup folder. Click Open.



Photos Takeout Backup

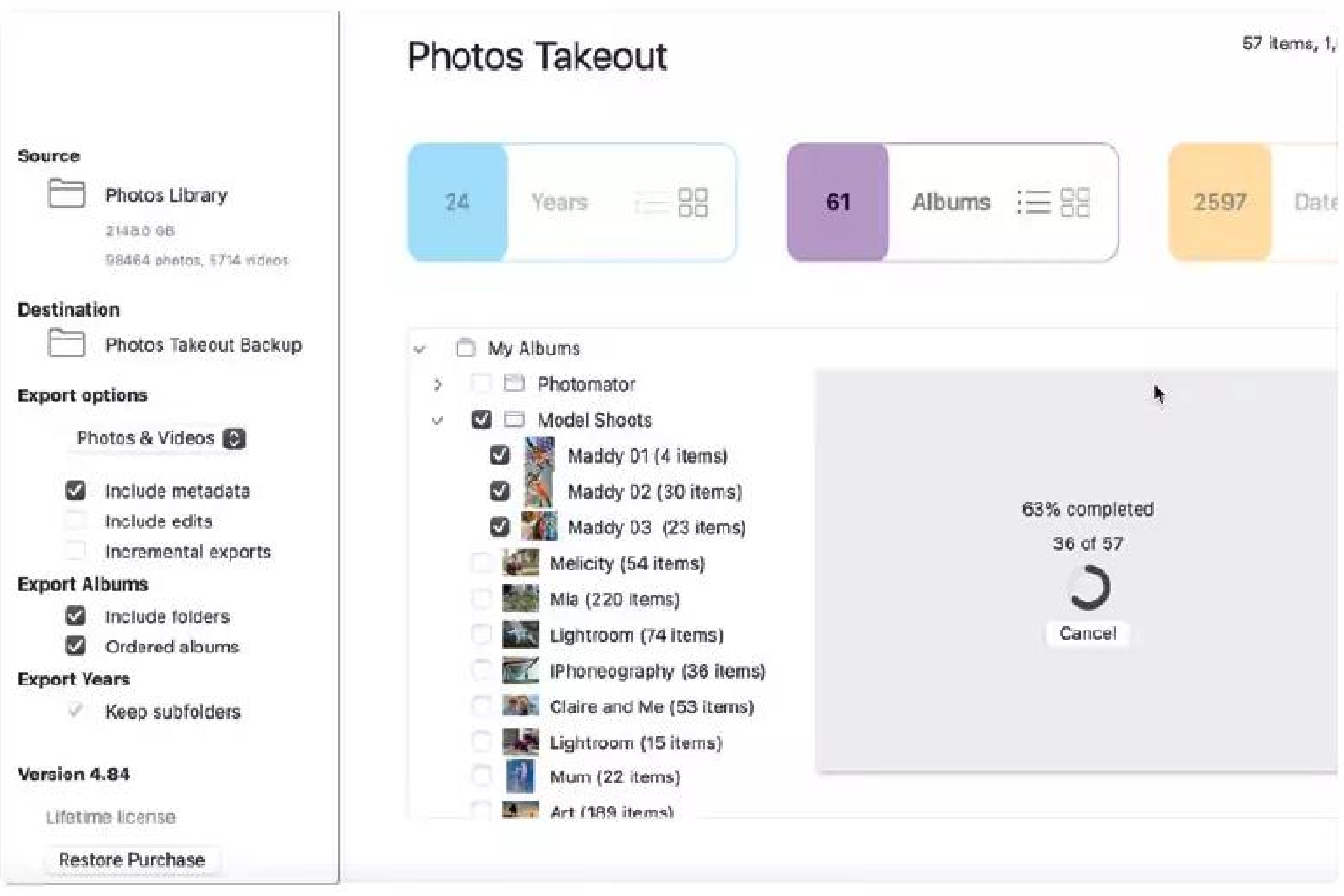
Export options
Photos & Videos
☑ Include metadata
☐ Include edits
Incremental exports
Export Albums
☑ Include folders
☑ Ordered albums
Export Years
✓ Keep subfolders

Version 4.84

10 (10)
All Photos (1)

## 2 Export options

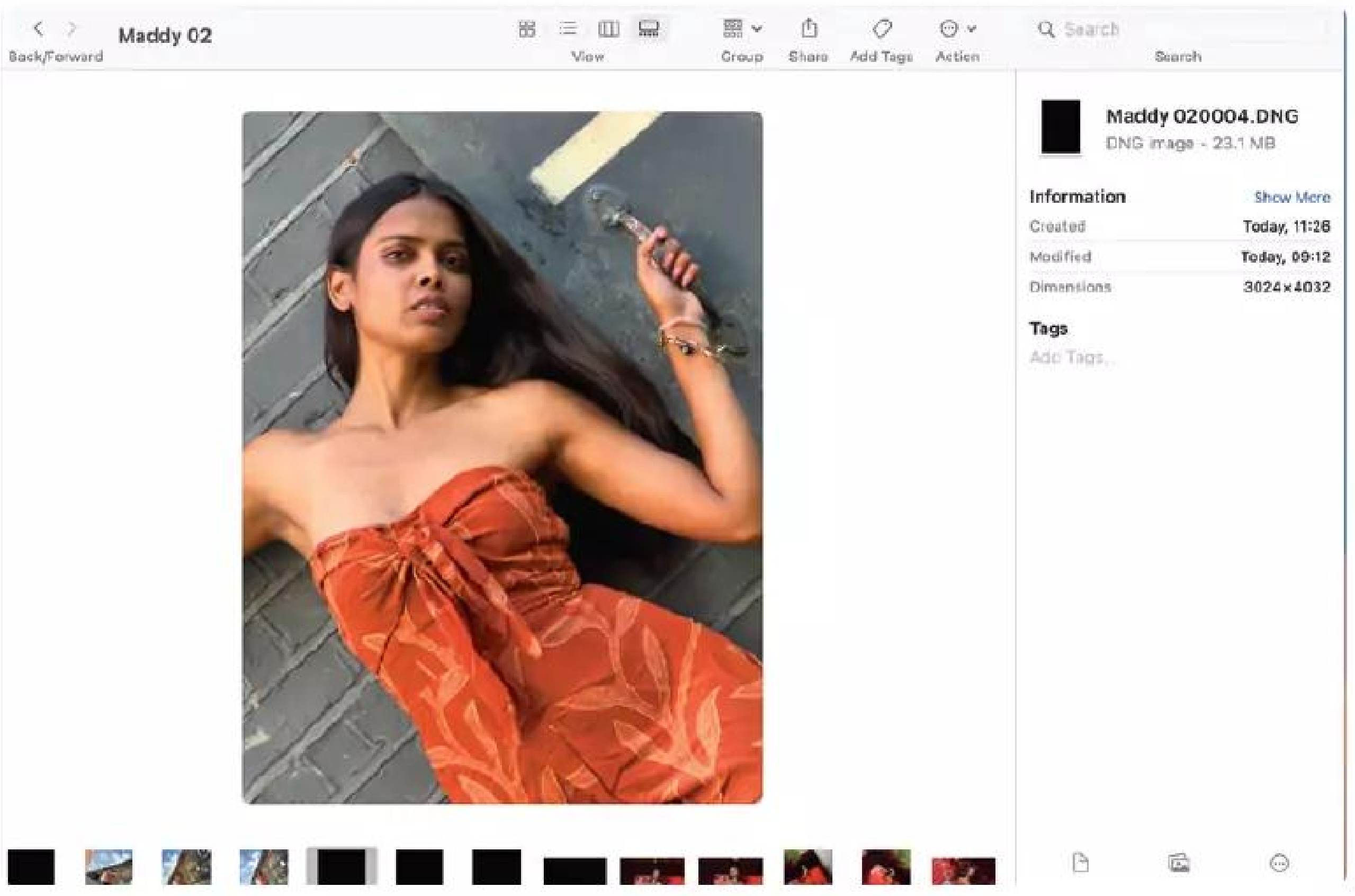
In Export options, choose Photos, Videos or both. Uncheck the Include Edits box. This will ensure that full-size originals such as DNG Raw files will be backed up instead of just smaller edited JPG versions.



Photos Takeout
Years
Albums
63% completed
36 of 57
Cancel

## 3 Back up albums

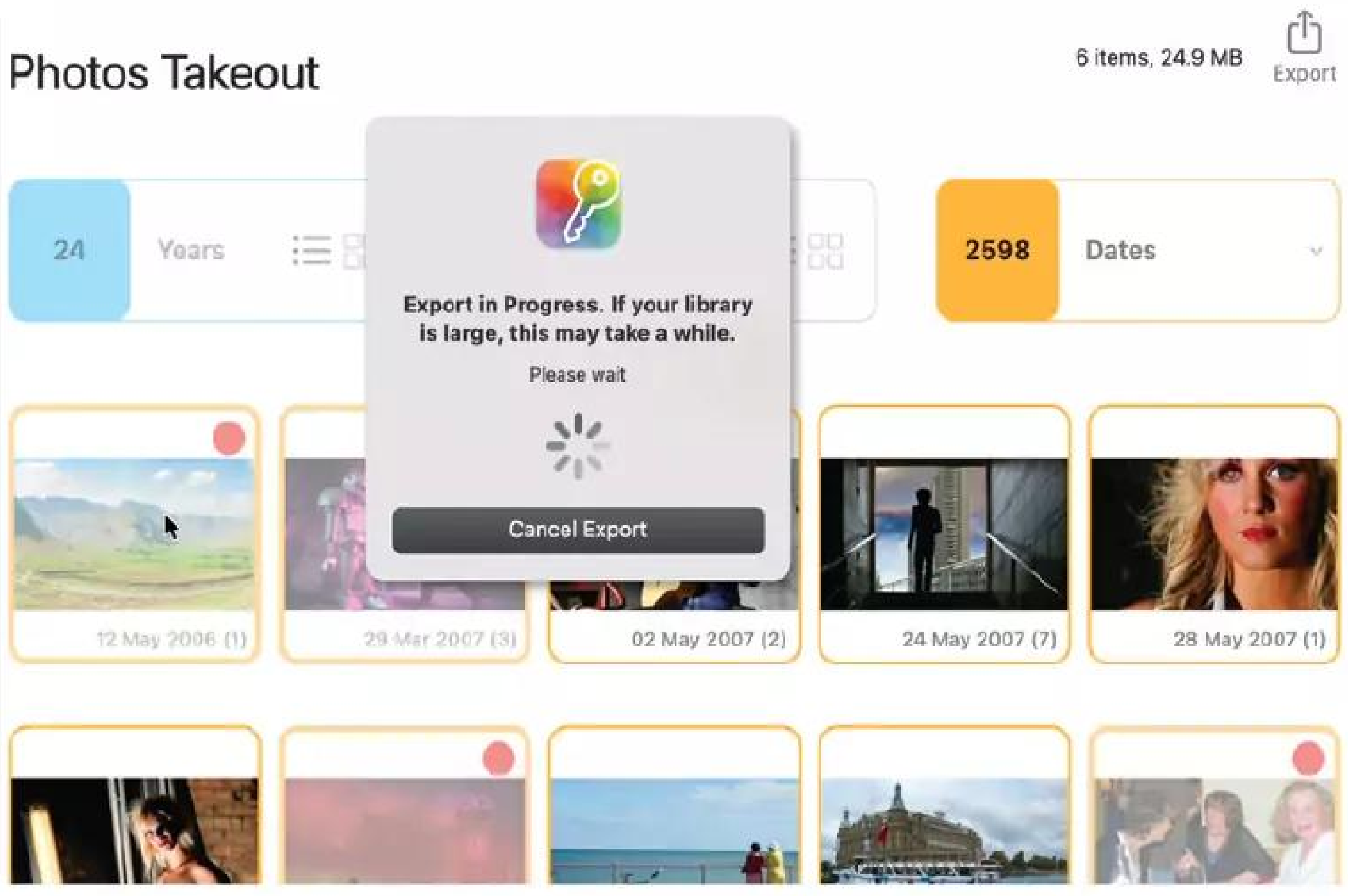
In Photos, you may have an Album containing subfolders. In Photos Takeout's Export Albums section, check Include Folders. Click the Albums list view to see folder hierarchies. Check the folders and click Export.



Maddy 02
Maddy 020004.DNG

## 4 View your backup

Browse to the Destination folder. The backed up Photos Album's hierarchy of folders and subfolders is intact. JPG and DNG files should also be present and correct (as long as you unchecked Include Edits in step 2).

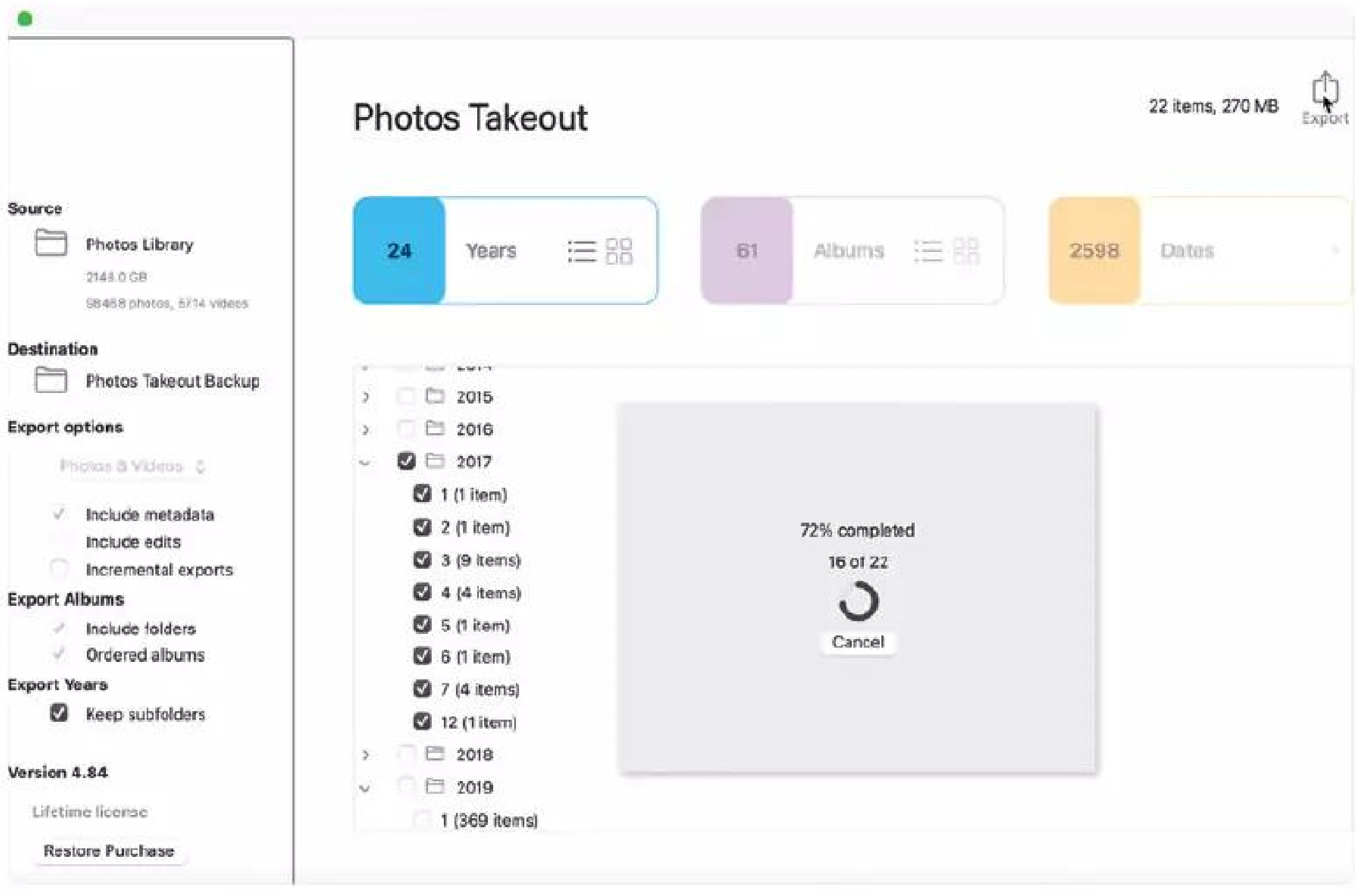


Export in Progress. If your library is large, this may take a while.
Please wait

Photos Takeout
6 items, 24.9 MB
Export
Years
2598
Dates
Cancel Export

## 5 Save the date

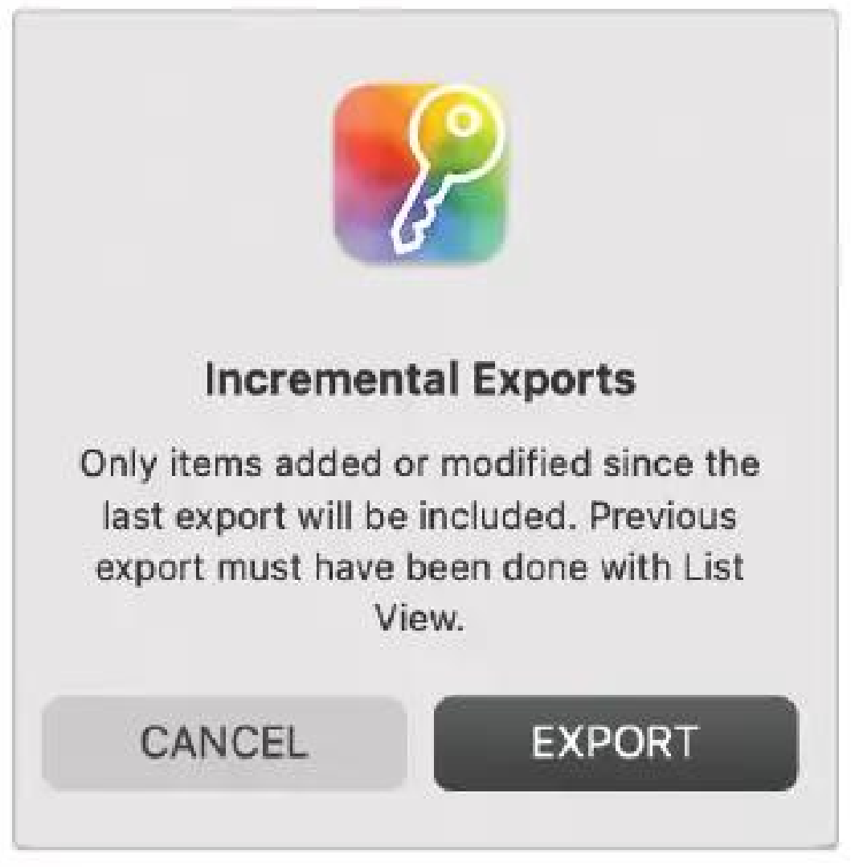
Click Dates. This panel displays icons, not a list view. Hold Cmd and click on the thumbnails of the specific dates that you want to back up. Click Export to save each selected dates' photos into separate labelled folders.



Photos Takeout
Years
Albums
Dates
72% completed
Cancel

## 6 Export years

Check the Keep Subfolder box in the Export Years section of the side panel. Click on the Years list view. Check the boxes of the year (and months) that you want to back up. Click Export to save the files in numbered folders.



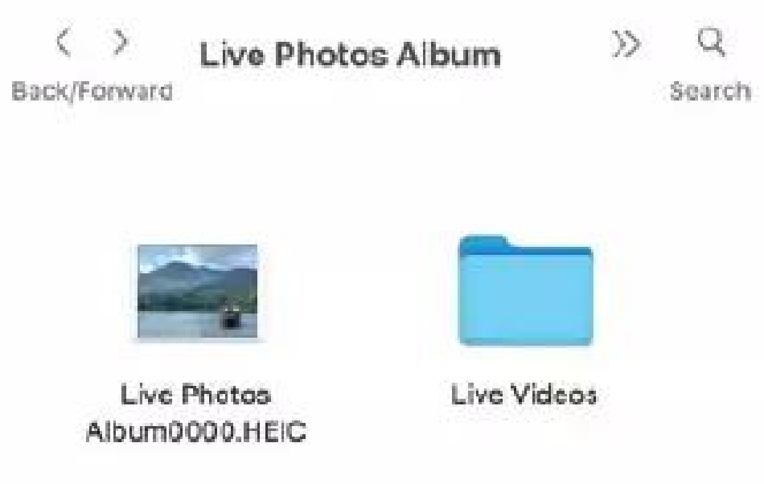
Incremental Exports

Only items added or modified since the last export will be included. Previous export must have been done with List View.

CANCEL
EXPORT

## JARGON BUSTER

By checking the '**Incremental exports**' option, only photos that have been added or modified since the last export will be sent to the destination backup folder.



Live Photos Album
Live Photos Album0009.HEIC
Live Videos

## GENIUS TIP!

When you export a Live Photo via Photos Takeout it is converted into a JPG. A 4-second mini movie is also stored in a separate folder so that you can see every frame.

# Phone & tablet tips

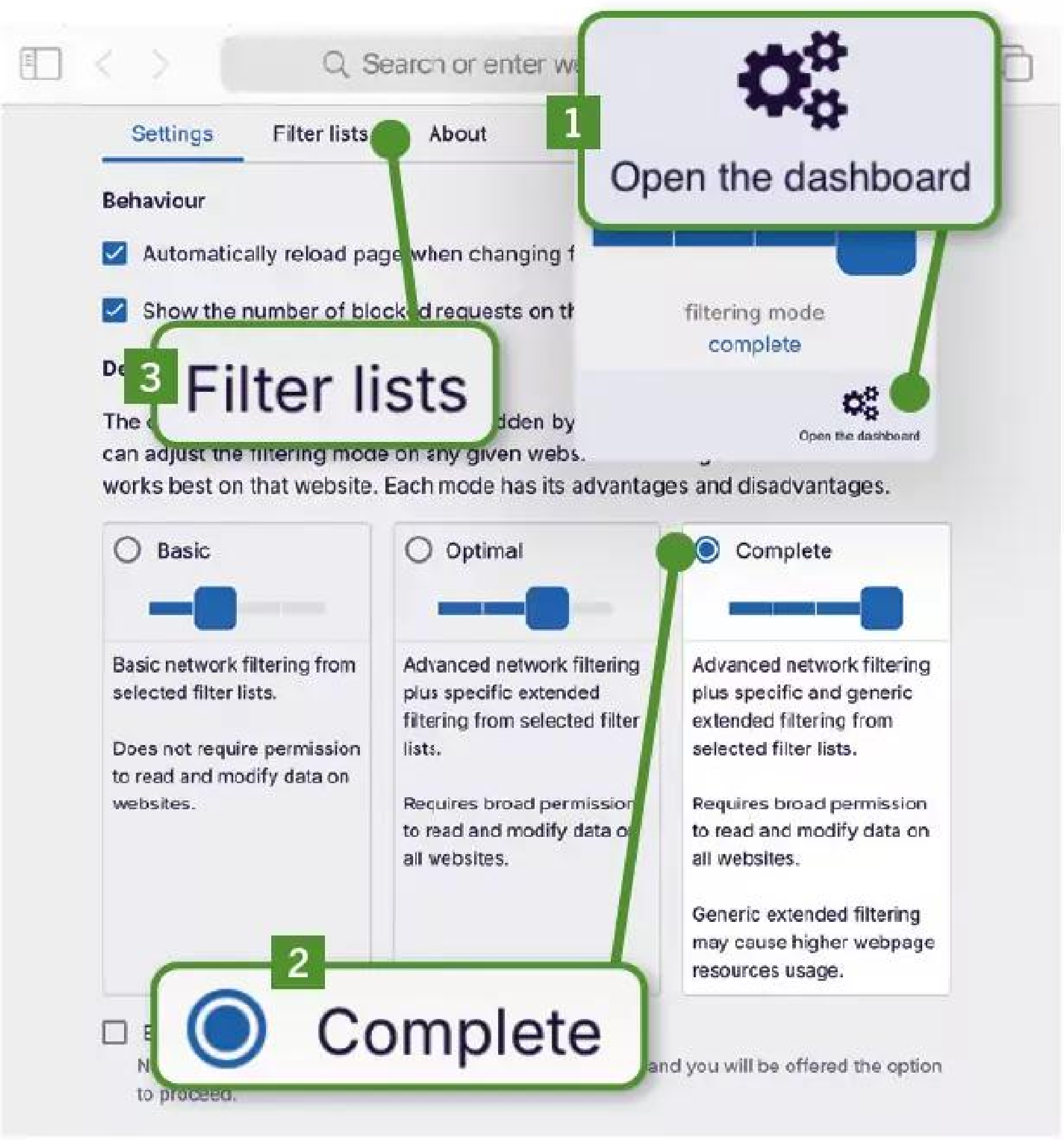
Brilliant things to do on your device.

iOS

## BLOCK ADS IN SAFARI USING UBLOCK ORIGIN LITE

Although Apple's Safari browser can block pop-ups, prevent cross-site tracking and hide your IP address from known trackers, it doesn't include an ad blocker. There are several apps for blocking ads in Safari, including AdGuard (**tinyurl.com/APC552guard**) and Ghostery (**tinyurl.com/APC552ghost**), and now there's an even better option – uBlock Origin Lite (**tinyurl.com/APC552block**).

The brilliant content blocker was added to the Apple App Store in August, letting you use it with Safari on your iPhone or iPad. This means you can now filter ads and trackers from web pages as effectively as you can in your desktop browser.



☑ Automatically reload page when changing f

☑ Show the number of block d requests on th

can adjust the filtering mode on any given webs

works best on that website. Each mode has its advantages and disadvantages.

○ Basic: Basic network filtering from selected filter lists. Does not require permission to read and modify data on websites.

○ Optimal: Advanced network filtering plus specific extended filtering from selected filter lists. Requires broad permission to read and modify data o all websites.

● Complete: Advanced network filtering plus specific and generic extended filtering from selected filter lists. Requires broad permission to read and modify data on all websites. Generic extended filtering may cause higher webpage resources usage.

and you will be offered the option to proceed.

To set up uBlock Origin Lite, install the app then open the Settings app on your iPhone or iPad. Tap 'Apps' then Safari, followed by Extensions. Select 'uBlock Origin Lite' and switch on Allow Extension.

The extension will automatically block ads and trackers as you browse the web. You can adjust its default filtering mode by pressing the Extensions (jigsaw piece) icon in Safari's address bar and tapping uBO Lite, then 'Open the dashboard' (1 in our screenshot below left).

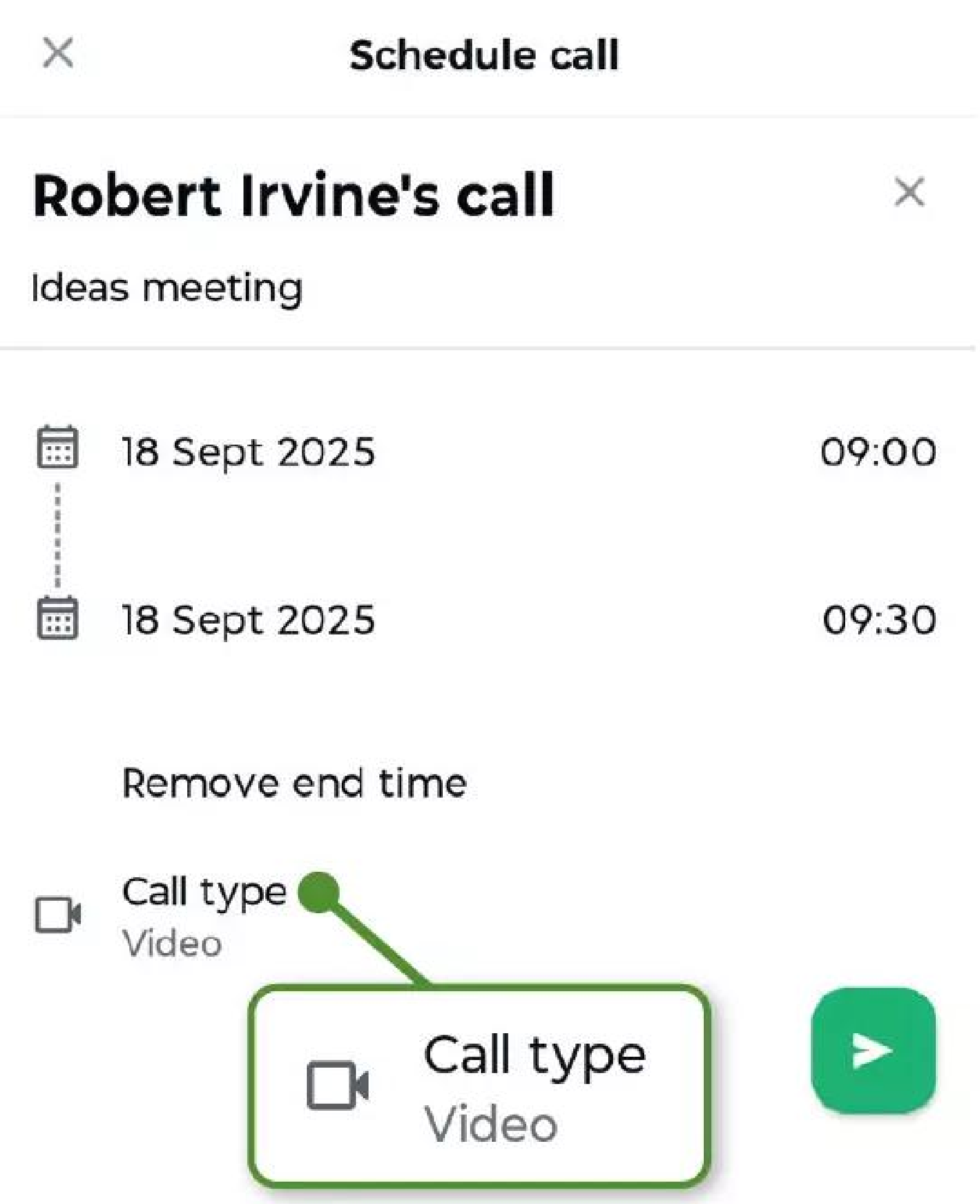
Set the mode to Complete 2 to block the maximum number of ads. Tap the 'Filter lists' tab 3 to enable filters for blocking other annoyances, such as cookie-consent banners.

Note that your iPhone or iPad must be running iOS/iPadOS 18.6 to use uBlock Origin Lite in Safari.

ANDROID & iOS

## SCHEDULE VOICE AND VIDEO CALLS IN WHATSAPP

WhatsApp has added the option to schedule voice and video calls you make through the app. This lets you plan ahead when, for example, you want to coordinate a remote family catch-up or organise a meeting with colleagues. You could also use it to schedule one-on-one calls with friends, though that might seem rather officious.



**Robert Irvine's call**

Ideas meeting

18 Sept 2025 09:00

18 Sept 2025 09:30

Remove end time

Call type: Video

To use the new feature, press the Calls tab in WhatsApp, tap the green Call button and choose 'Schedule call'. Select the date, start and end times of your call (you can remove the latter), enter an optional description, and specify whether it's a voice or video call (see screenshot above). Tap the green Send button, choose the contacts you want to invite to your call, then tap Send again.

You can see your upcoming calls on the Calls tab, including a list of attendees. To change the details or cancel the call, tap 'Edit event'. All participants will receive a notification when the call is about to begin.

ANDROID & iOS

## SUPPORT YOUTUBE CREATORS BY 'HYPING' VIDEOS

YouTube has added a new Hype option to its Android and iOS app, to help support smaller creators. Each time you 'hype' a

---

## Best new apps What you should install this month

### CASSETTE: HOME VIDEO PLAYER

Free*

**iOS** tinyurl.com/APC552cassette

This retro-style video player lets you watch videos stored on your iPhone or iPad like you're watching old VHS tapes. It displays video files as video-cassette icons, which you tap to load in the slot on the old- fashioned TV. The free version plays a random video – pay $1.99 a month to choose the content to play on-screen.

Years
Take Me Somewhere

### ENTE PHOTOS

Free*

**Android** tinyurl.com/APC552ente

**iOS** tinyurl.com/APC552enteio

This privacy-focused photo-backup app has improved its AI-powered face detection and added new layout options. These group your pictures by day, week, month or year. Ente has also launched an advanced image editor that lets you adjust brightness, contrast and colour, apply filters and emojis, and doodle on your photos.

Cancel
Done
new car!
Brush Color

### ORGANIC MAPS

Free

**Android** tinyurl.com/APC552maps

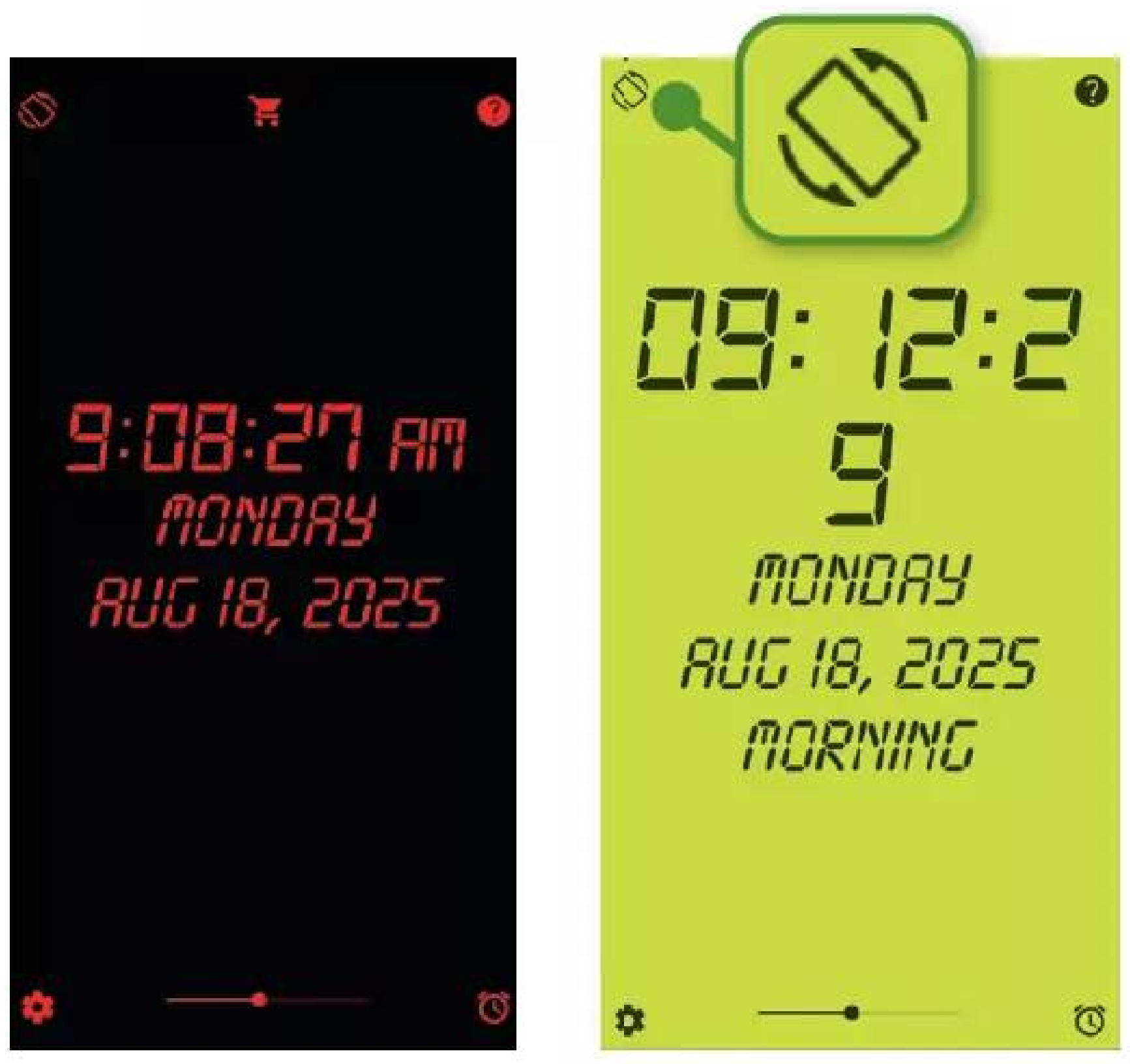
**iOS** tinyurl.com/APC552mapsio

Organic Maps has updated its OpenStreetMap data to display hiking and cycling routes on all maps you download to explore offline. To view these, tap the Layers button top left and select Hiking and Cycling in the 'Map Styles and Layers' panel. The Android version has also added track-elevation graphs to maps.

Map Styles and Layers
×

*Contains in-app purchases

## Best apps for... Upgrading your phone's clock


9:08:27 AM
MONDAY
AUG 18, 2025
09: 12:29
MONDAY
AUG 18, 2025
MORNING

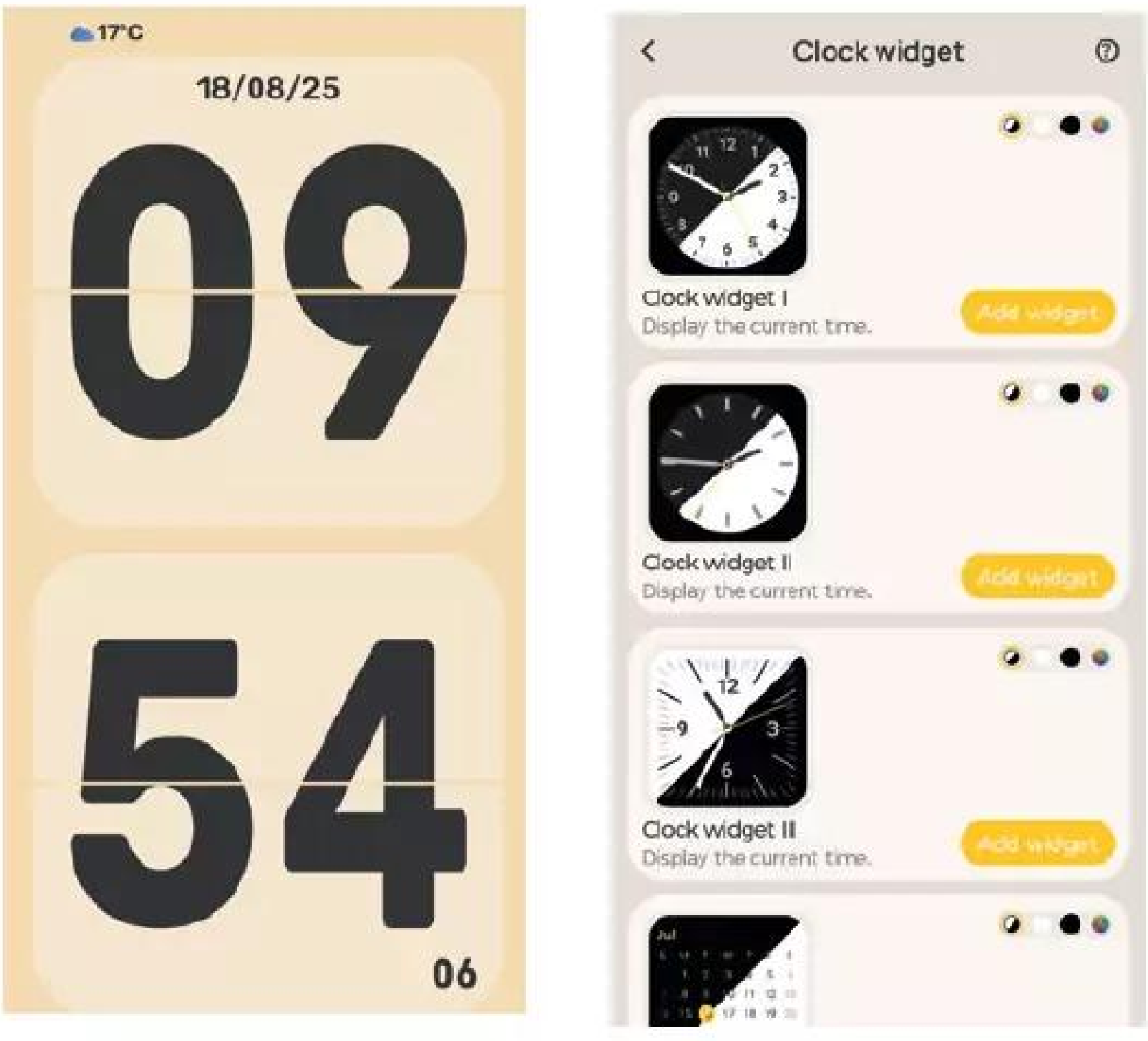
### DIGITAL CLOCK

Free*

**Android** tinyurl.com/APC552clock

Many free clock apps suffer from ads and unnecessary features, but Digital Clock keeps things clean and simple. View the time, day and date; change the background colour by swiping left or right; tap the icon top left to switch orientation; and use the slider to adjust brightness levels. It syncs with the alarm clock on your Android phone.

**Best for:** Simple time display


18/08/25
09
54
06
Clock widget
Clock widget I
Clock widget II
Clock widget III
Add widget

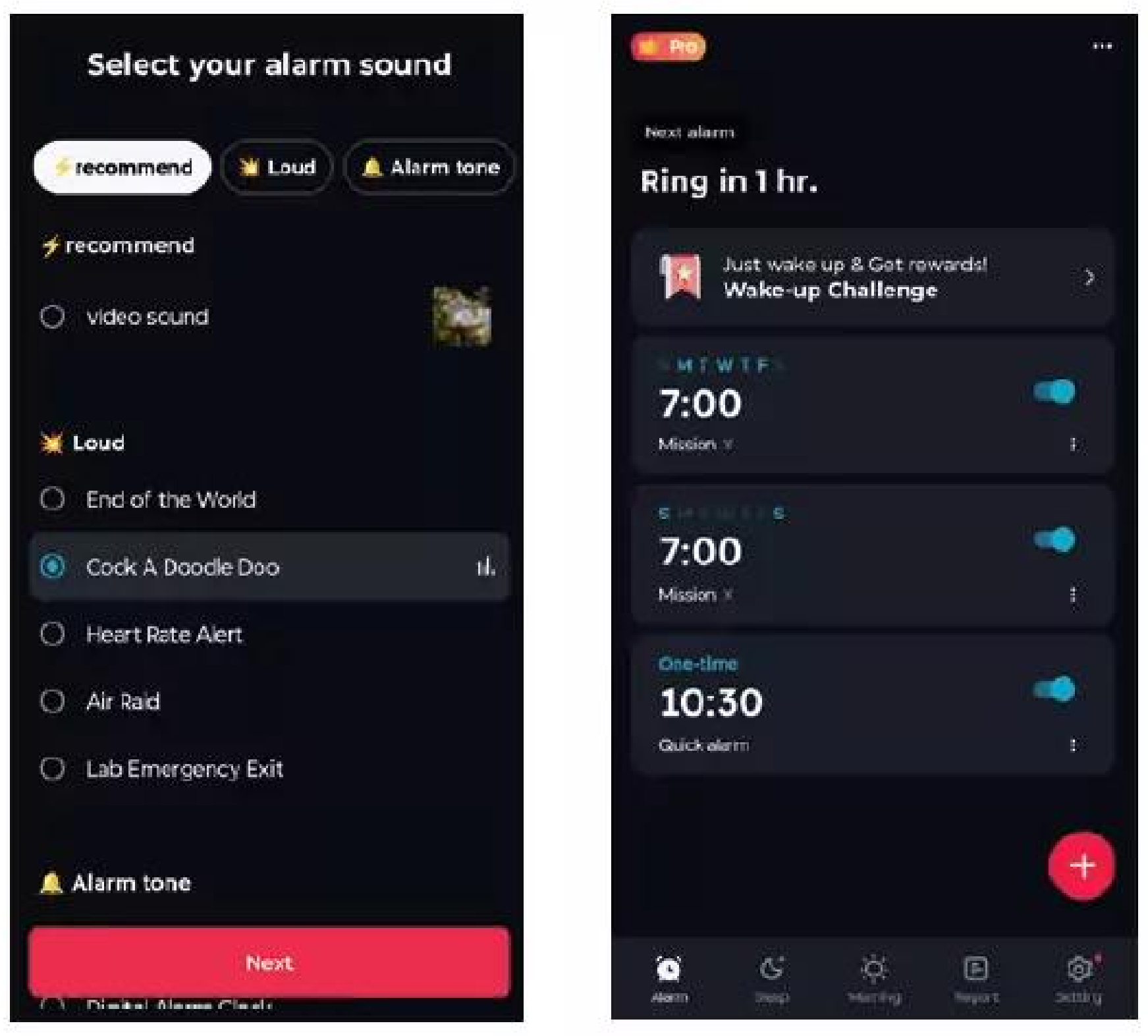
### FLIP CLOCK – WORLD CLOCK

Free*

**Android** tinyurl.com/APC552wclock

This customisable clock offers a choice of colourful themes and can display the weather and your phone's battery status. You can make it tick and chime on the hour, view the time in different cities around the world, and add a clock widget to your home screen. For iOS, try ClockPhone (**tinyurl.com/APC552clockph**), which has a similar design and options.

**Best for:** Customising your clock


Select your alarm sound
recommend
Loud
Alarm tone
video sound
End of the World
Cock A Doodle Doo
Heart Rate Alert
Air Raid
Lab Emergency Exit
Next
Ring in 1 hr.
Wake-up Challenge
7:00
7:00
10:30

### ALARMY

Free*

**Android** tinyurl.com/APC552alarm

**iOS** tinyurl.com/APC552alarmio

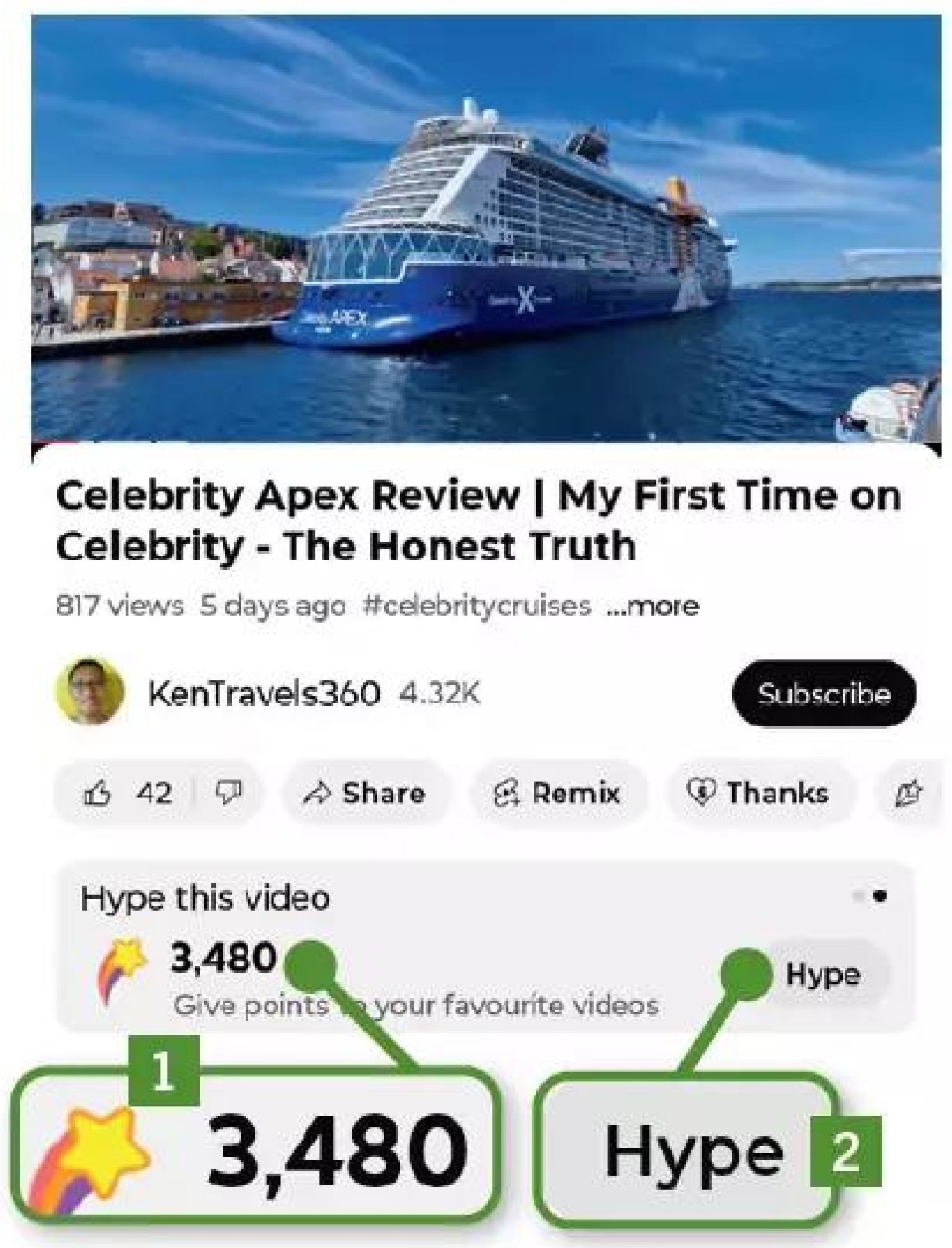
Alarmy gets you up in the morning using a loud sound of your choice. These range from a cockerel crowing and air-raid sirens to cheerful tunes and motivational sounds. Set 'missions' you need to complete to make sure you're wide awake, including typing challenges, and customise Alarmy's appearance with 'feel good' wallpapers.

**Best for:** Personalised alarm clock

---

video, the YouTube channel that created it earns points that give it a chance of ranking on a new leaderboard.

You can only hype videos for YouTube channels that have between 500 and 500,000 subscribers, the video must have been uploaded within the last seven days and it needs to be a long-form clip.


Celebrity Apex Review | My First Time on Celebrity - The Honest Truth
817 views 5 days ago #celebritycruises ...more
KenTravels360 4.32K
Subscribe
42
Share
Remix
Thanks
Hype this video
3,480
Give points to your favourite videos
Hype
1
3,480
Hype
2

To hype an eligible video, either swipe left on the Comments preview below the video player or press the Like button. This will open a 'Hype this video' card that shows how many points your Hype is worth (1 in our screenshot above). Tap the Hype button 2 to give the YouTube creator that reward. You can view the Hype leaderboard by tapping the compass icon to open the Explore menu and selecting Hype. This ranks the top 100 hyped videos and lists the clips you've hyped yourself.

ANDROID

### ORGANISE CHROME TABS INTO GROUPS

All the main desktop browsers let you organise related tabs into themed groups, to make it easier to find them when you have lots of web pages open. The feature is also available in the Android version of Chrome (**tinyurl.com/APC552chrome**), and the latest update to the browser (to version 139) makes it much easier to use.

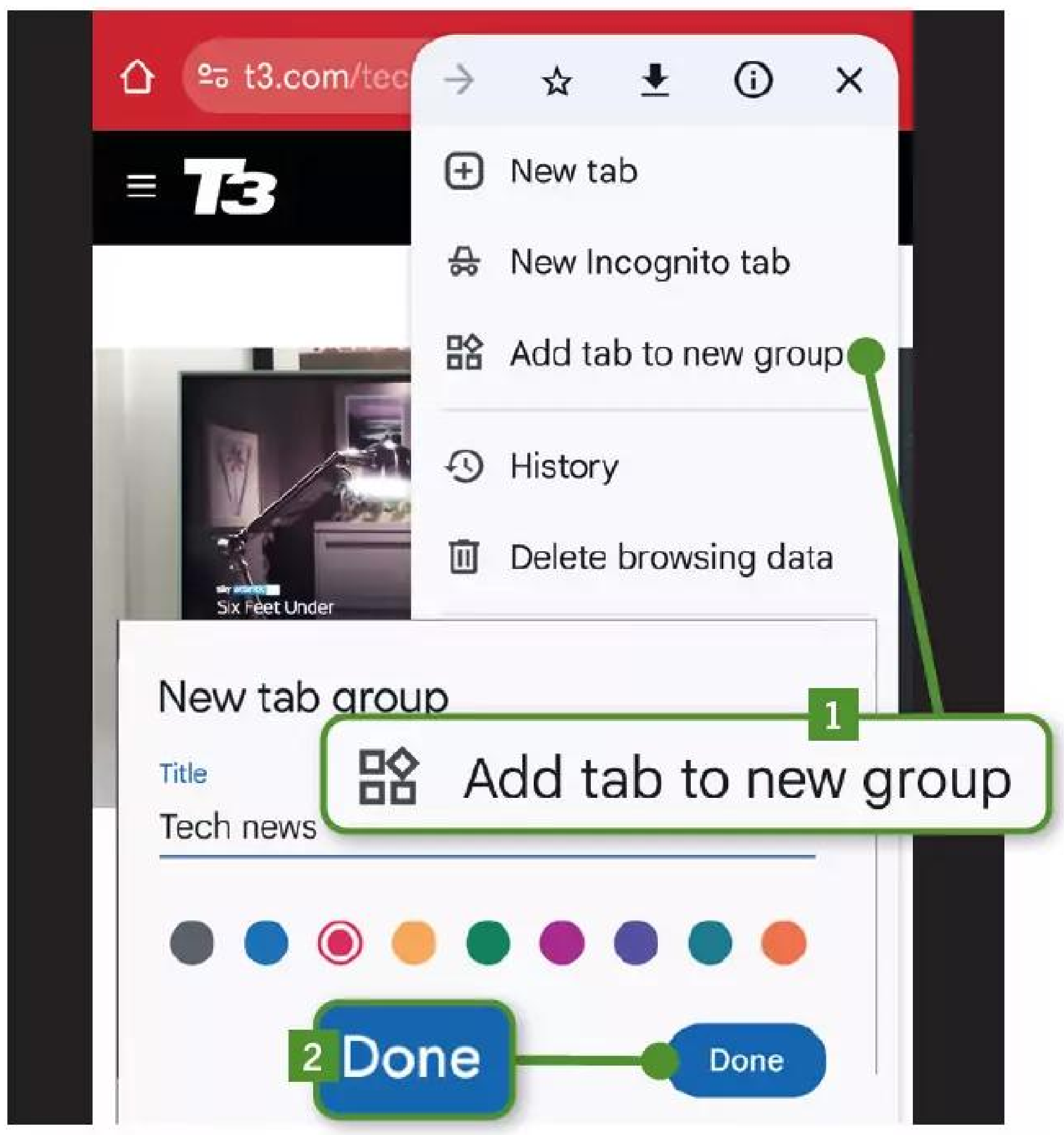
To group tabs in Chrome on your phone or tablet, tap the browser's three-dot menu button and choose the 'Add tab to new group' option (1 in our screenshot below). Enter a name for the group, assign it a colour and tap Done 2. Add further tabs to the group by selecting 'Add tab to group' in the menu, then the group name.

You can access your tab groups by tapping the tab-switcher icon to the right of the address bar. To create another group, tap the menu button again and choose 'New tab group'.

ANDROID

### SORT YOUR GOOGLE KEEP NOTES BY DATE

The Android version of the popular note-taking tool Google Keep (**tinyurl.com/APC552keep**) has added the handy option of sorting your notes by date. Previously, they were presented randomly on the app's home screen, but now you can keep them better organised.


t3.com/tec
T3
New tab
New Incognito tab
Add tab to new group
History
Delete browsing data
Six Feet Under
New tab group
Title
Tech news
1
Add tab to new group
2
Done
Done

To do so, tap the new Sort (double-arrow) button in the 'Search your notes' box and choose 'Date created' or 'Date modified' (see screenshot left) to sort your notes accordingly.

Alternatively, select Custom to arrange your notes in whatever way you prefer to have them. ■

# DOWNTIME

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122 **Game changer:** Obsidian's classic RPG *Pillars of Eternity*

Brave RPG devs battle hateful retailers.

# Infinity's End

## Retailer 'advice' put an end to games like *Baldur's Gate*.

HOPE CORRIGAN

**Classic RPGs make up some of the most formative examples of late '90s to early 2000s PC gaming in my memory, but I also remember when they weirdly disappeared. If you loved games like the original *Baldur's Gate*, *Icewind Dale*, or *Planescape*, and also wondered why we stopped seeing these kinds of titles for a bit there, well it turns out you can blame physical retailers for the decline in *Dungeons & Dragons*-style PC RPGs.**

The Infinity Engine was used to power isometric roleplaying games like the ones above. It allowed game devs to take many of the sentiments and mechanics used in *D&D* and translate them to videogame experiences. It allowed a lot of people to have these kinds of adventures for the first time, especially when good Dungeon Masters are always so hard to find.

"The reason we stopped making Infinity Engine games was because retailers told us no one wanted to buy them," says Josh Sawyer – who now serves as Obsidian's studio design director but cut his teeth working on games like *Icewind Dale* – during his keynote speech at GCAP 2025 in Melbourne, Australia. "We asked if we could see the research and they basically told us to trust them," he adds to sad chuckles from the crowd.

PMCS BECAME ADVANCED WARFARE'S VILLAINS

### DIFFERENT LANDSCAPE

It seems odd for retailers, especially physical ones, to have so much power in today's world, but Sawyer explains it was a very different

**AddOn-b-Gone**

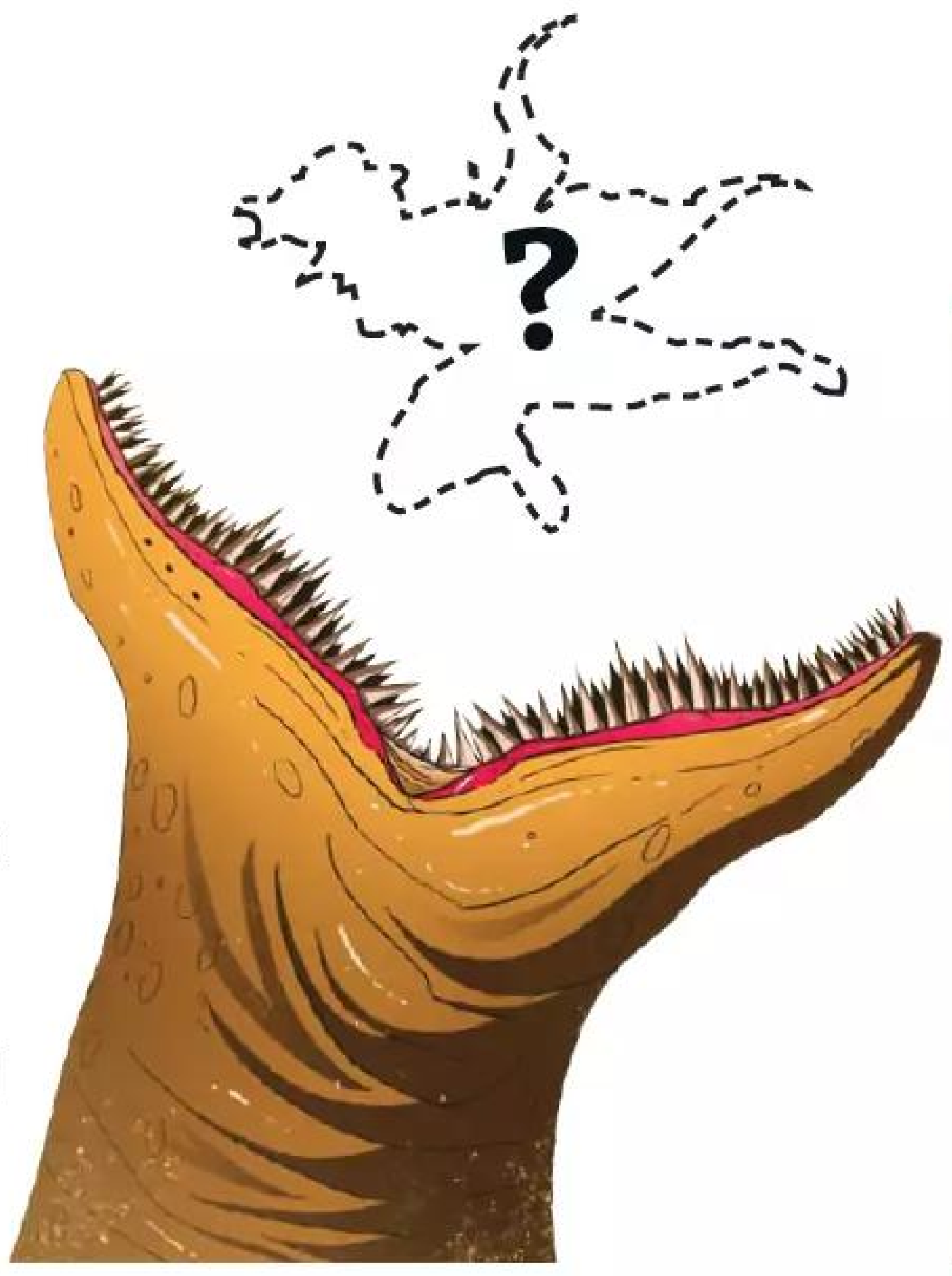
## WOW'S SAYING GOODBYE

*World of Warcraft: Midnight* is officially killing the MMO's 21-year-old arms race with UI modders. Director Ion Hazzikostas tells us, "I do think that it is too hard," to hardcore raid without AddOns, and that "consequently, hardly anyone is attempting to do that". Yeah, he's got a point. ■

**Return to sender**

## STEAM MESSED UP

*Planet Centauri* was all geared up for success. With over 130,000 people wishlisting the game, developer Permadeath waited with bated breath for release day. But when that day came no one noticed, because Steam never told wishlisters – a bug that affects a small number of games. ■



**Ugh**

## TESTING MY PATIENCE

Here's an idea to log under 'ways to ruin someone's morning'. Every day at AI company Graphite, an engineer rocks up to work to find their account deleted. This forced them to go through the same onboarding process as users in order to find and fix issues. An act known as 'dogfooding'. ■

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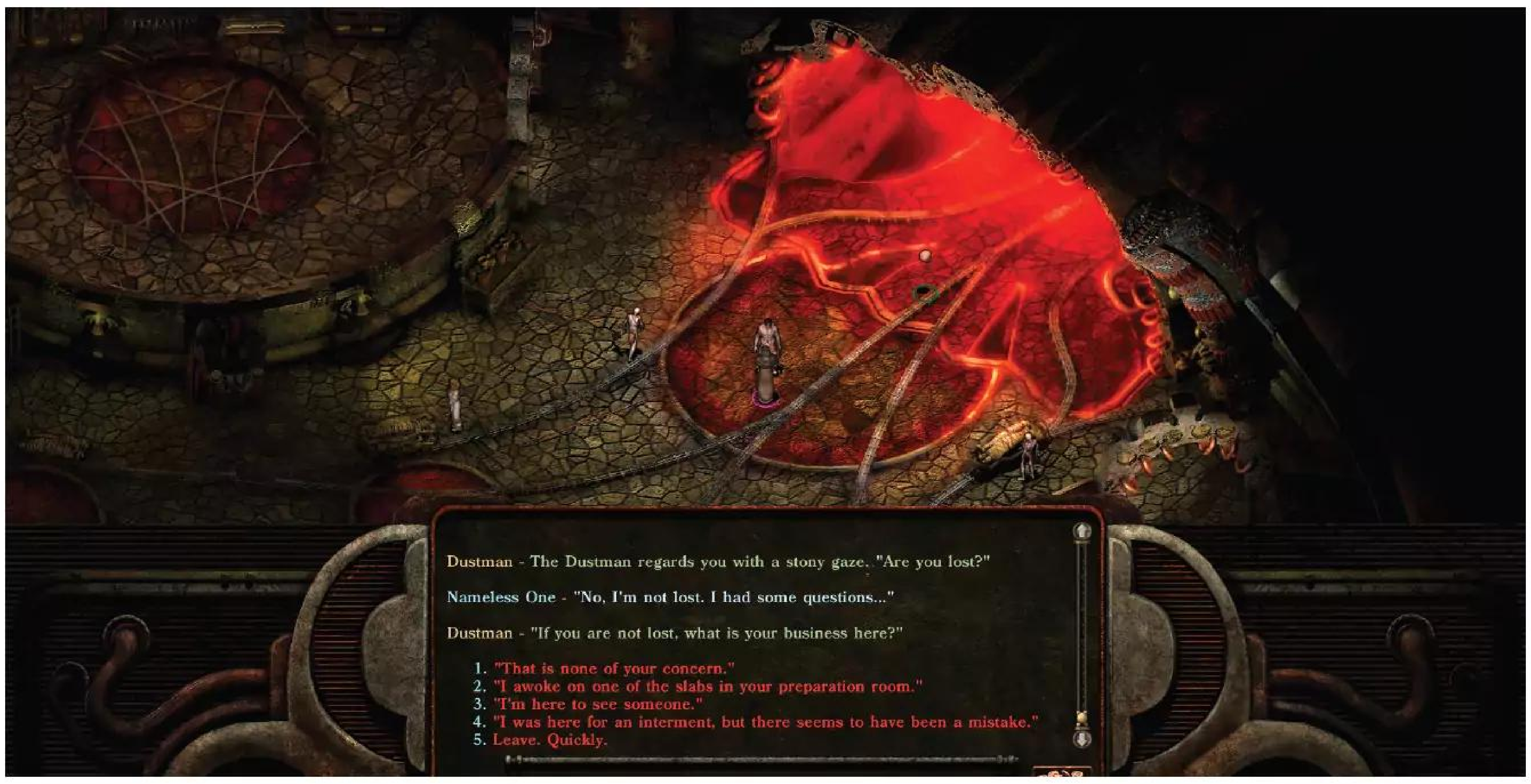


Dustman - The Dustman regards you with a stony gaze. "Are you lost?"

Nameless One - "No, I'm not lost. I had some questions..."

Dustman - "If you are not lost, what is your business here?"

1. "That is none of your concern."
2. "I awoke on one of the slabs in your preparation room."
3. "I'm here to see someone."
4. "I was here for an interment, but there seems to have been a mistake."
5. Leave. Quickly.

**TOP:** We never got *Planescape 2* and I've decided to blame EB Games.

**ABOVE:** The Infinity Engine had its charms.

landscape. Back then, retailers had a lot of power over game developers because if they wouldn't stock your game there weren't any other options.

Not only that, but storage, taking up shelf space, and displays meant retailers could be very picky about what they stocked in order to maximise profits. They'd even force companies to buy back games if they weren't selling.

### BRICK AND MORTAR

With this power, brick and mortar stores were able to put the pressure on and change the landscape to suit them, not necessarily the consumers or the developers. And so, the Infinity Engine well ran dry some time in the early 2000s. It was out with the crunchy, stat-heavy RPGs of yore and in with stuff that was brighter, splashier, easier to grasp at a glance, and that looked very impressive on store shelves.

Now we have much more digital distribution, which Sawyer says gives developers of all sizes far more power and agency in the scene. While there's no guarantee you'll get sales, at the very least you can still list a game on a platform like Steam, where people have a chance of seeing and buying it without retailers having to decide they should. ■

## Highs & Lows

### HIGHS

**Breaking the Chains**
*Battlefield 6* dev says its destruction tech is so great because, "We're not on the PS4 or Xbox One any more."

**Dwarf Your-tress**
*Dwarf* Fortress says it's "giving storytelling *tools* back to the people".

**High Wisdom**
Larian boss Swen Vincke reminded execs that "making games faster and cheaper while charging more has never worked before".

**Disunified**
*Fallout Shelter*, Pentiment and other Unity games had to be briefly delisted on Steam thanks to Unity's security vulnerability.

**Uncivil**
Ubisoft reportedly cancelled an *Assassin's Creed* game set around the American Civil War.

**Not Gnarly**
EA is charging *Skate* players $35 for a cardboard Dead Space skin.

### LOWS

# Incoming

THE BIGGEST GAMES ON THE WAY

## 1 month

**RELEASE** November 13, 2025

**DEVELOPER** Ubisoft Mainz

### ANNO 117: PAX ROMANA

The latest entry in the long-running Anno series promises to let gamers shape the Roman Empire in their image, be that via strong economic growth or bloody warfare.

**RELEASE** November 14, 2025

**DEVELOPER** Treyarch, Raven Software

### CALL OF DUTY: BLACK OPS 7

Robots, zombies and guns, lots of guns. The latest co-op and multiplayer shooter promises to be the most mind-bending Black Ops ever.

**RELEASE** December 8, 2025

**DEVELOPER** Ryu Ga Gotoku Studio

### YAKUZA 0 DIRECTOR'S CUT

Fight through the entertainment districts of 1980s Tokyo and Osaka as yakuza Kazuma Kiryu and cabaret club manager Goro Majima. It's time to crack skulls.

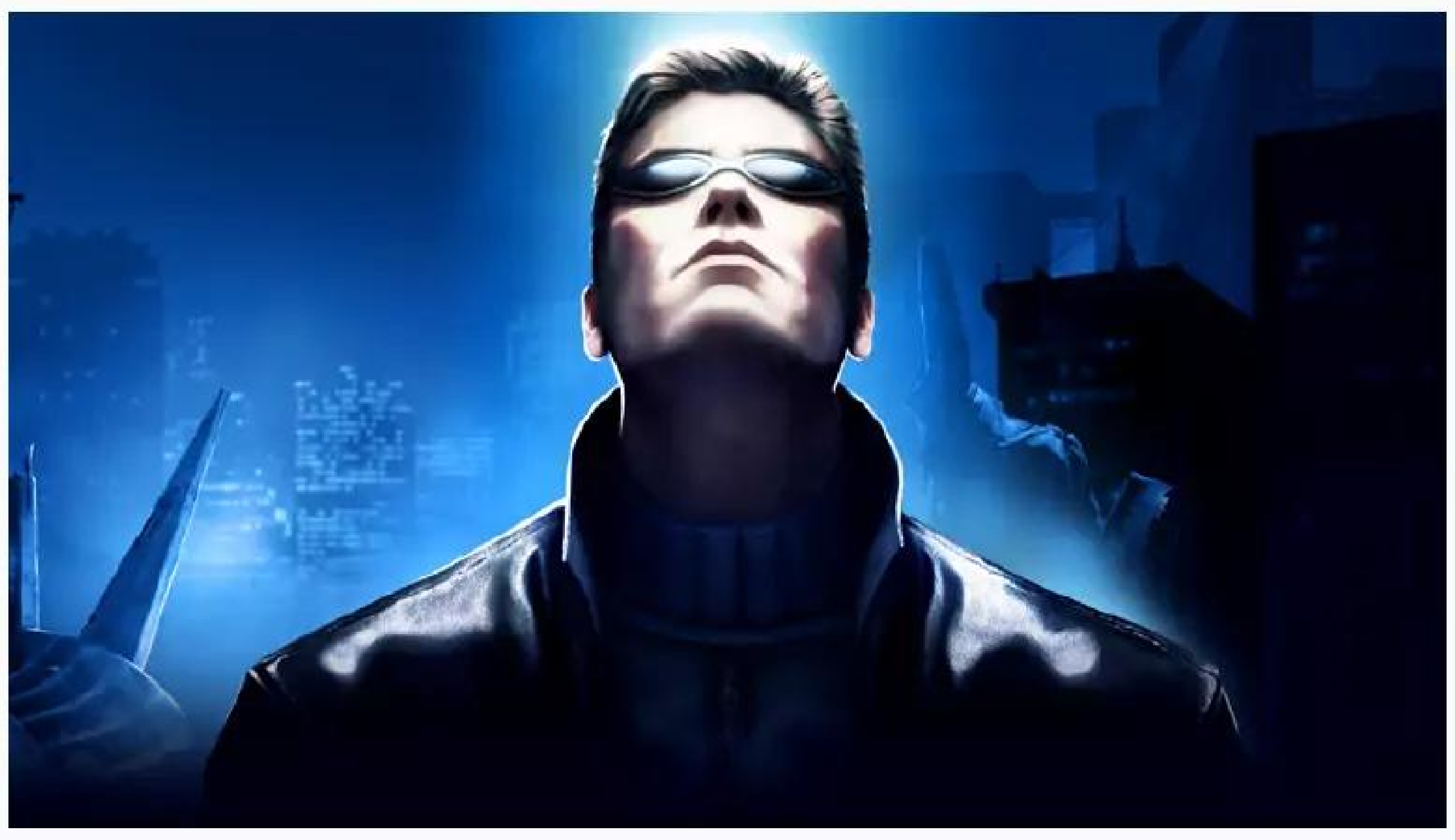
## 2 months

**RELEASE** January 29, 2026

**DEVELOPER** Bandai Namco Studios Inc.

### CODE VEIN II

In a dystopian world overtaken by Revenants, play as a Revenant hunter who must travel into the past with a mysterious girl called Lou in order to save the planet.



**RELEASE** February 5, 2026

**DEVELOPER** Aspyr

### DEUS EX REMASTERED

The legendary cyberpunk immersive sim is back, with this new remaster promising visual upgrades, quality-of-life improvements and all-new animations.

**RELEASE** February 27, 2026

**DEVELOPER** Capcom

### RESIDENT EVIL REQUIEM

Return once more to Racoon City, the home of the mysterious Umbrella pharmaceutical company, as Grace Ashcroft, an intelligence analyst for the FBI.

## 3 months

**RELEASE** TBC

**DEVELOPER** Bit Reactor

### STAR WARS ZERO COMPANY

What happens if you take the turn-based combat system from *XCOM* and smash it together with the Star Wars universe? *Zero Company* is what happens.

**RELEASE** 2026

**DEVELOPER** IO Interactive

### 007 FIRST LIGHT

Step into the shoes of James Bond before he attained his 00 status. From the makers of *Hitman*, this third-person action-adventure game promises espionage and quips.

**RELEASE** 2026

**DEVELOPER** Capcom

### ONIMUSHA: WAY OF THE SWORD

Wield a variety of deadly weapons as famous sword master Miyamoto Musashi. Incredibly visceral and kinetic combat is promised as Musashi fights through Edo-era Kyoto.

## 4 months+

**RELEASE** 2026

**DEVELOPER** Unknown Worlds Entertainment

### SUBNAUTICA 2

An open-water survival game where you must craft vehicles, tools and bases to survive on a mysterious alien world. Visually, this is looking like a total treat.

**RELEASE** 2026

**DEVELOPER** Playground Games

### FABLE

A reboot of the old action-RPG series originally crafted by Peter Molyneux's Lionhead Studios, *Fable* promises a visually spectacular return to the fantasy world of Albion.

**RELEASE** TBC

**DEVELOPER** Mundfish

### ATOMIC HEART 2

The bonkers Soviet Union-themed *BioShock*-like returns for more violence. If you're a sucker for dystopia and retrofuturism then this is one to keep an eye on.

**MOD**

### EYE-SHADOWHEART

**Posho goth girl Shadowheart was illustrated originally with some pretty epic eyeshadow and face tattoos, which didn't then make it into her final design. However, if you want to reinstate the daughter of darkness's original look, then now you can thanks to the Shadowheart Concept Art Face Tattoos mod. Grab it here: tinyurl.com/76e97vka**

# Special Report

APC INVESTIGATES

SPECIAL REPORT

# Matter of timing

*Silksong* highlights the difficulty of picking a release date and the risks in delays.

***Hollow Knight: Silksong* isn't *Grand Theft Auto VI*, but the number of games that scurried away from its September 4 release date, announced as a surprise just two weeks ahead of time, gave it the air of a game nothing could compete with. But what does competing mean when the game in question is a 2D platformer sequel with a cult-like following?**

Of the delayed games, you can easily see why a *Metroidvania* sequel like *Aeterna Lucis* would be sweating. But what about the games that are less obviously aimed at the same exact players? Shouldn't they be fine even if *Silksong*'s a mega hit, considering there are more PC gamers than ever?

"You can go to the likes of *GameDiscoverCo* and look at data for past high-performing titles with similar release dates until your corneas crumple to try and discern the material effects of 'audience overlap,'" says Brian Kwek, the head of tactical RPG *Demonschool*'s indie publisher Ysbryd Games. *Demonschool* was delayed to November 19 to give it a better shot at success.

"With *Demonschool* and *Silksong* both being multi-platform simultaneous releases, we have to consider more than 'just' the Steam algorithm, so this ultimately requires us to consider the impact of *Silksong* on the console gamer audience and how they're hearing about games like *Demonschool* through broader coverage from content creators and press," Kwek says. Streamers are a key avenue for indie games like *Demonschool* to get noticed, and as with other Ysbryd-published games such as *World of Horror*, it's more likely to be played by 'variety' streamers who bounce between games. And those streamers are likely to be focused on the higher-profile game during its launch week.

"Even if it's just a week, that's a week that *Demonschool* – or any game still holding on to the September 3/4 release date – would have been cut off from building its own critical mass of discourse about their own game. I think that can be fatal in this saturated market, where every game has to fight and use whatever edge they've got available to stay visible."

Ysbryd and *Demonschool* developer Necrosoft Games' original choice of September 3 was based on careful consideration of more than just competing games: it followed the news deluge of Gamescom and PAX West in late August, but predated a busy October including one of Steam's demo festivals. Despite Steam Next Fest being a prime opportunity for developers to get eyeballs on their upcoming games, it can be "a black hole of visibility that is maybe almost as deadly, if not more deadly, than launching next to *Silksong*".

## Follow knight

*Silksong* was announced in February 2019. After appearing in Edge in December 2020, silence ensued until April 2022, when Team Cherry said "it can't be too much longer, surely!" Xbox then said it'd arrive within 12 months. In May 2023, Team Cherry broke the bad news: nope. That was it til 2025, when Nintendo declared it was coming soon; Team Cherry finally dropped the date on August 21.

DESTIN

Can't we just beat them up?

FAR LEFT: This boss is really excited about *Silksong*'s release.

LEFT: A tempting strategy indeed.

## MOVING TARGETS

*Four games that moved their release date after Silksong's surprise announcement.*

### BABY STEPS

Bennett Foddy's *Getting Over It* successor gave its "unemployed failson" a two-week reprieve from falling down.

### CLOVERPIT

The "roguelite slot machine nightmare" was meant to release September 3, but jumped to September 26.

### LITTLE WITCH IN THE WOODS

This cutesy life sim was leaving early access on September 4, but delayed 11 days "given its immense influence".

### AETERNA LUCIS

The indie *Metroidvania* sequel hoped to land in September, but decided to move to next year instead.

Publishers like Ysbryd know that delays come with their own downsides, though, including disappointing or angering players who have had their expectations upended; those reactions made him "miserable". There's also a load of stress that comes with reaching out to partners like PlayStation, Nintendo and Xbox to see if a last-minute delay is even feasible, as those requests are not usually well received as it affects scheduling for other games.

Any time a game with a previously announced release date is delayed, you can bet loads of hand-wringing went into the decision, says Adam Lieb, the founder and CEO of game marketing platform Gamesight.

"When I see backlash, I'm like, [the studio] sat in a room and sweated about this for two weeks," he says. "This is a really important decision, could be the difference between success and failure, and oftentimes it's a really expensive decision. I think that's one thing that often isn't considered by, like, Reddit: you build a game to launch on a certain date, and build to how much it costs to make that game. When I delay a game a month, I have to pay that entire team a whole extra month with zero revenue coming in the door. That's really expensive."

And the bigger the game, the costlier the move: triple-A games that buy TV commercial slots or billboards in advance have to pay a fee to move those ads or even forfeit the money altogether. But there is one more layer to the release-date-delay-decision-making dance, and that's the potential benefit from launching in the afterglow of a big, eyeball-drawing launch.

### WELL-KNOWN PHENOMENON

"It's a pretty well-known phenomenon that when the biggest games of the year launch on Steam everyone makes more money," Lieb says. "There are just more people on Steam in that window; that's eyeballs on your stuff, on all the algorithmic ranking pages, people in the desktop app, which can lead to more sales."

To use a crude blast zone analogy, once you're outside the 'ground zero' radius of a game like *Silksong* landing, a game going after the same target audience could stand the benefit from its impact. "You're getting people who are in the mood for this one thing… when *Oblivion Remastered* came out and *Expedition 33* came out, you could say '*Oblivion*'s so huge, nobody's going to play this other game' – I played them both basically at the same time… *Oblivion* definitely is what got me in an RPG mood, and I stayed in that RPG mood."

PUBLISHERS LIKE YSBRYD KNOW THAT DELAYS COME WITH DOWNSIDES

Launching a game at just the right time seems like it's about as easy as landing a space shuttle in a driveway while wearing oven mitts. Even when you do your best to plan ahead, there's always a chance things will go comically wrong. Ysbryd and Necrosoft actually did try to account for the possibility of a *Silksong* surprise launch at Gamescom or a release date announcement, but figured the latter would be at least a month out.

"In this situation, it's impossible to know what the 'right' answer is," Kwek says. "I just pray that we are able to do our best to get eyes onto *Demonschool* with the audiences who'll dig it!" ■ ***Wes Fenlon***

**apc**
**HIGHLY RECOMMENDED**

# CLASS WARFARE

## After languishing in Call of Duty's shadow, Battlefield 6 now has all the juice.

**MORGAN PARK**

**It says something about the state of the FPS that the hype for *Battlefield 6* is mostly down to the old, not the new. Here we are, howling at the moon for decades-old modes, 'grounded' character models, classic class setups and a map from 2011. Series vets are gobbling up this sequel as if we haven't eaten for weeks while patting Dice on the back for managing to execute a normal *Battlefield* game.**

Dice's last effort tanked expectations, but that's not why *Battlefield 6* has impressed me. It's the wider multiplayer culture of 2025 – wrung out by years of battle royale banality and meta-pilled ranked modes – that created the conditions for an ordinary Battlefield to be the most exciting FPS of the year.

Place your palm on the pavement, and you can feel the low rumble of a hobby yearning for what we loved 15 years ago: the spectacle of scale, the unserious chaos of vehicular warfare, red grunts vs blue grunts, the permission to make your own rules and an environment where the guy obsessed with metas is having the least fun. That is the pitch of Battlefield 6, and it's a bullseye.

At least, a bullseye where it matters most. *Battlefield 6* multiplayer gets two big thumbs up, with caveats. A 64-player round of Conquest remains a spiritual experience that no other series can touch. My body vibrates with anticipation every time I spawn into a chopper in the heat of battle, hit the deck to revive a squadmate in a smokecloud, or nail a 100-metre headshot from the safety of a mountain perch.

> **A round of Conquest remains a spiritual experience**

Those are all best experienced on Mirak Valley, the biggest and best map at launch, but as many worried would be the case after the open beta, the rest of the map pool can't measure up. The Halo Forge-like Portal mode feels like a first draft. Attachments are boring, progression is too slow, and lots of guns are locked behind grindy challenges. They're annoyances in what's the most fun I've had with a multiplayer FPS in years.

| | |
|---|---|
| **WHAT IS IT?** | The next mainline Battlefield with a full campaign and large-scale multiplayer |
| **EXPECT TO PAY** | $109.95 |
| **DEVELOPER** | Battlefield Studios |
| **PUBLISHER** | Electronic Arts |
| **REVIEWED ON** | AMD Ryzen 7 9800X3D, 64GB RAM, Nvidia GeForce RTX 5090 |
| **MULTIPLAYER** | Up to 64 players |
| **STEAM DECK** | Unsupported |
| **WEB** | ea.com/en/games/battlefield/battlefield-6 |

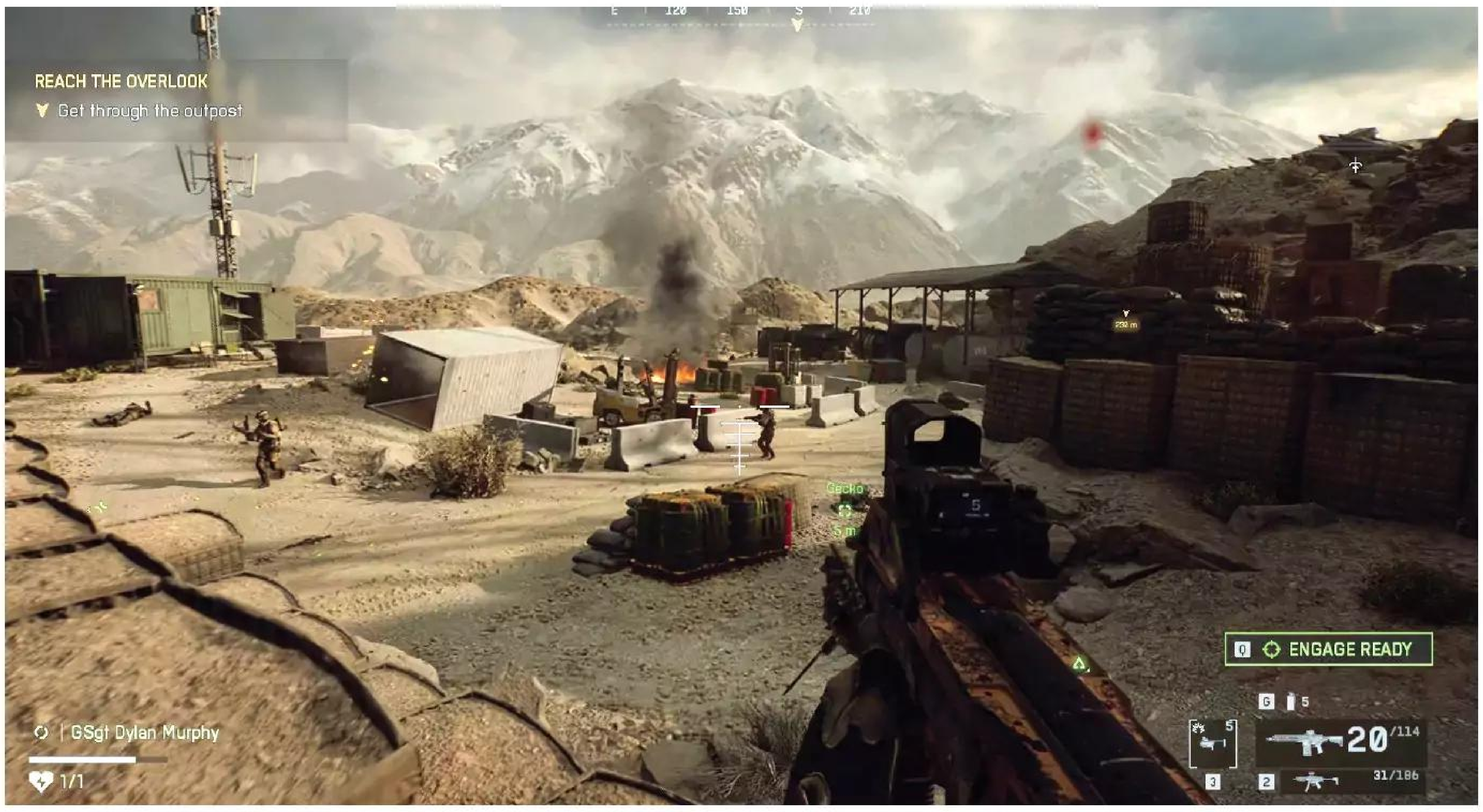
### GOOD TO BE BACK

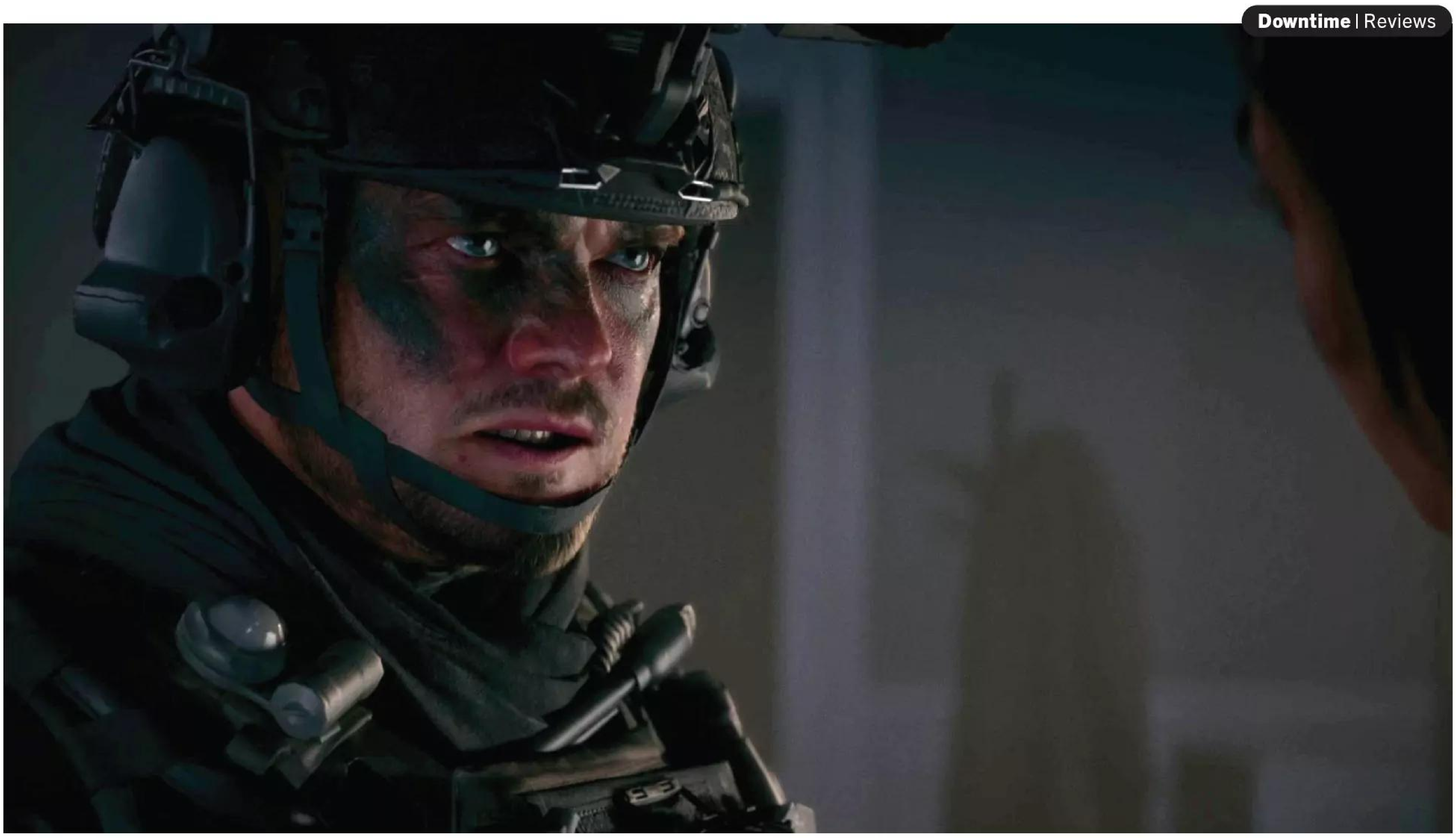
The greatest compliment I can pay to *Battlefield 6* is that it's the only game I want to play right now. I wake up in the morning and play through the previous night's highlights in my head – the unlikely revives, the tank runs, the 30-minute rounds that came down to a handful of tickets.

It's a game where a single 25-minute round can spawn a dozen storylines: two ace pilots duelling over control of the skies, the slippery engineer who makes tank drivers' lives a living hell, the squad dedicated to locking down a single flag no matter what, the guy who keeps driving the EOD bot around desperate to torch someone (anyone!) to death. *Battlefield 6* confidently hands players a sandbox and lets us find our own fun.

Balance is imperfect, of course, but not ruinous. Tanks are too flimsy against engineers packing three-to-five RPGs in their pockets, and I submit that 'land mine spam' is getting out of hand. But largely, the sacred infantry-armour-air hierarchy is as considered as you'd hope after 20 years of these games: tanks bully infantry, helicopters bully tanks, jets bully everyone, and infantry are

TOP: Note to self: never drive on roads.





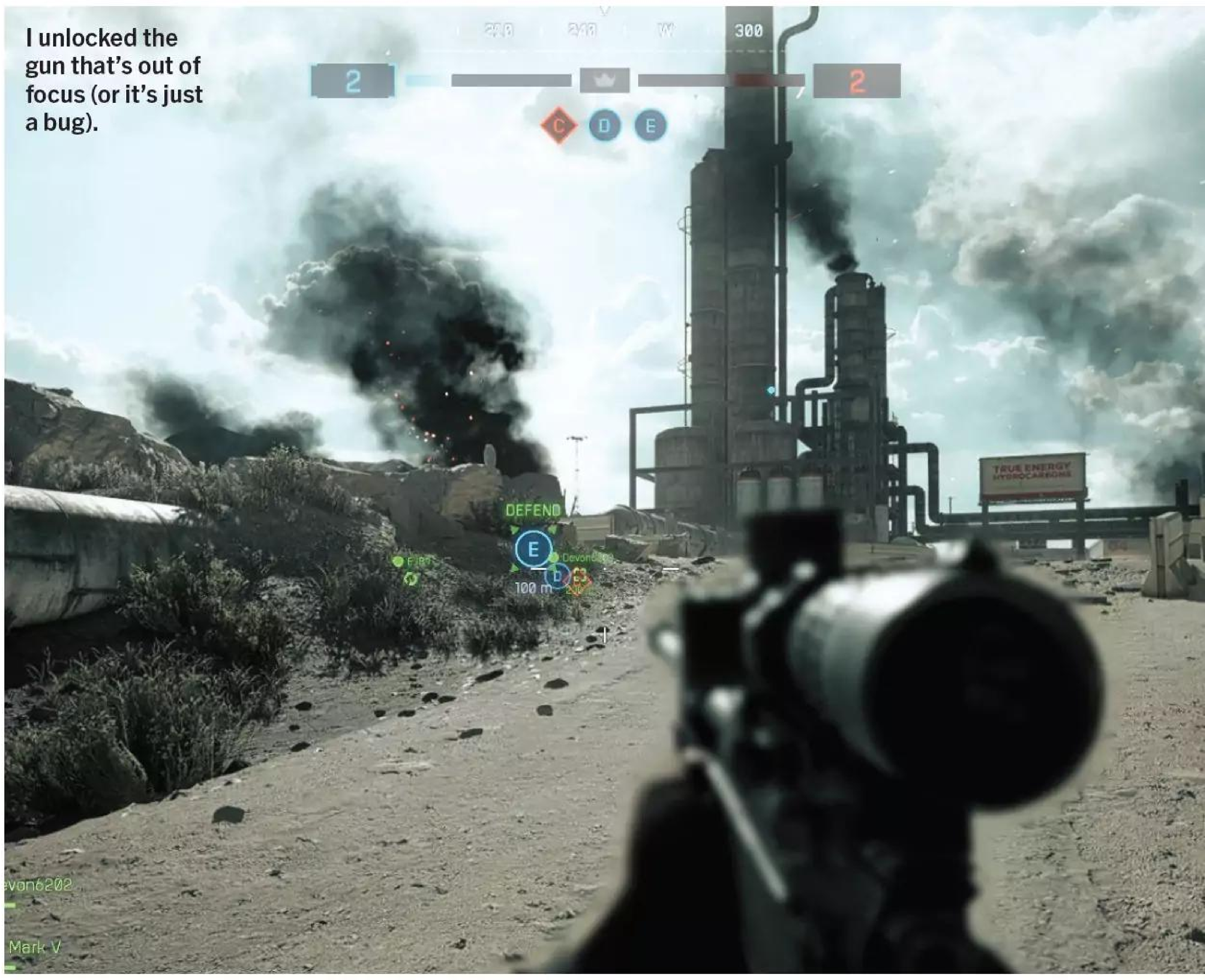
persistent little roaches that are easy to squash individually, but impossible to rid yourself of completely.

### GUN SHOW

If *Battlefield 6*'s best quality is that it's a lot like older Battlefields, the upgrade that justifies the new package is its gunplay. Gone are the moments in *Battlefield 2042* where aiming directly at an enemy resulted in bullets landing just behind them – *Battlefield 6*'s guns are loud machines with quick ballistics.

The renewed emphasis on punchy, reactive firefights in close quarters is part of a larger *Battlefield 6* aim to out-*Call of Duty* Activision. EA is trying very hard to bring a new audience into the fold – so hard that some of *Battlefield 6*'s design changes come off as bending over backwards to lure a type of player who expects a billion guns, hundreds of hours of grind, and smaller maps. *Battlefield 6* has *Call of Duty*'s Gunsmith, its gunplay, its firing range and its vehicle-less modes.

Some changes are ultimately wins, but with others, Battlefield Studios has stumbled into the same bad habits. *Battlefield* has inherited *CoD*'s 'every assault rifle is kind of the same' problem. The attachments themselves are boring: grips that lower recoil, muzzles that lower recoil, lasers that lower spread,


I unlocked the gun that's out of focus (or it's just a bug).

## MEET YOUR COWORKERS

*How classes have changed in Battlefield 6*

### ASSAULT

**Signature Weapon:** Assault rifle
**Primary gadget:** Adrenaline injector
**Gadgets:** Spawn beacon, grenade launcher, assault ladder.
**Assaults are the frontline bruisers.**

### ENGINEER

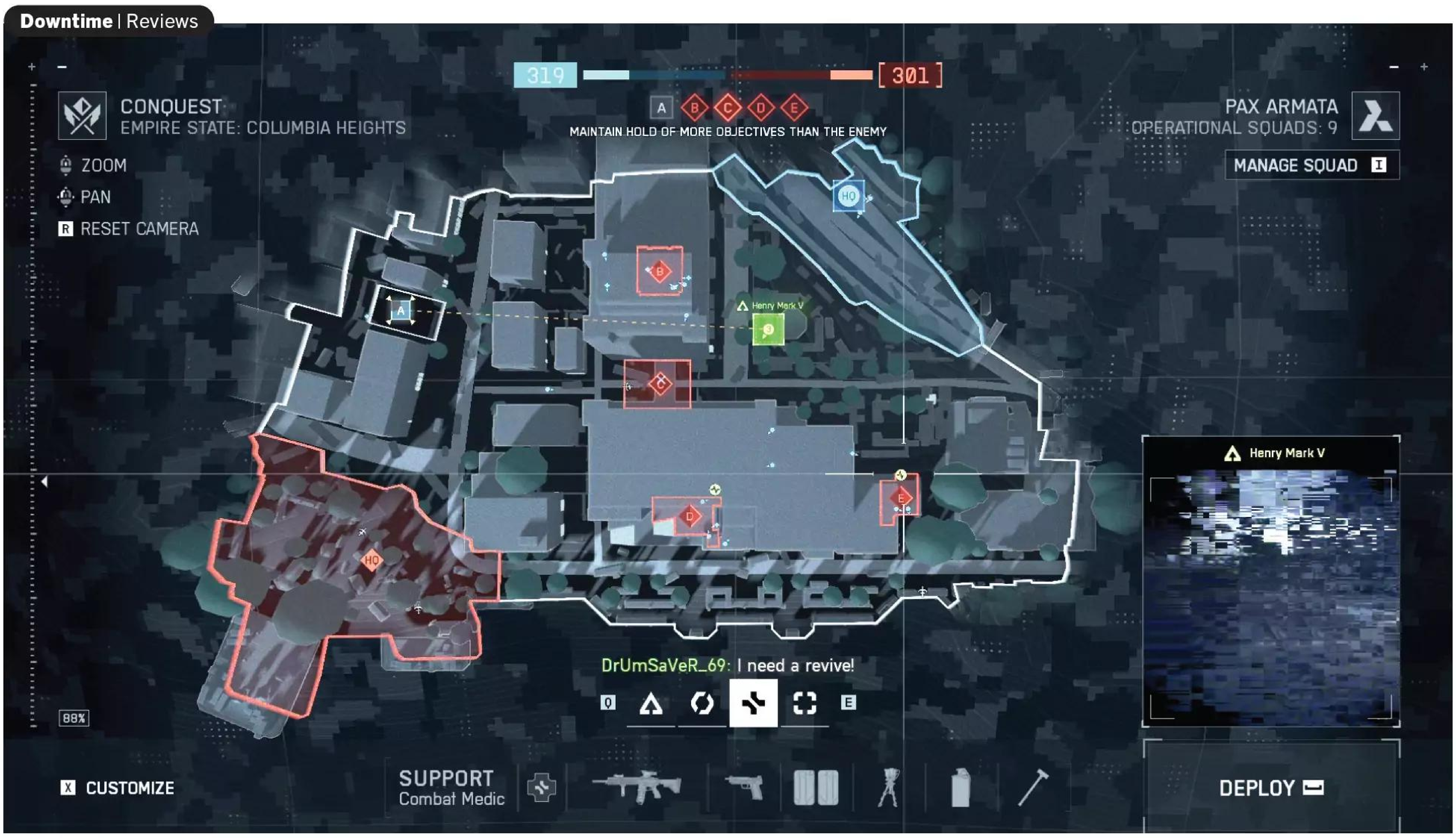
**Signature weapon:** SMG
**Primary gadget:** Repair torch
**Gadgets:** RPG, anti-tank mine, anti-air launcher.
**Engineer is the class best suited to take on armour.**

### SUPPORT

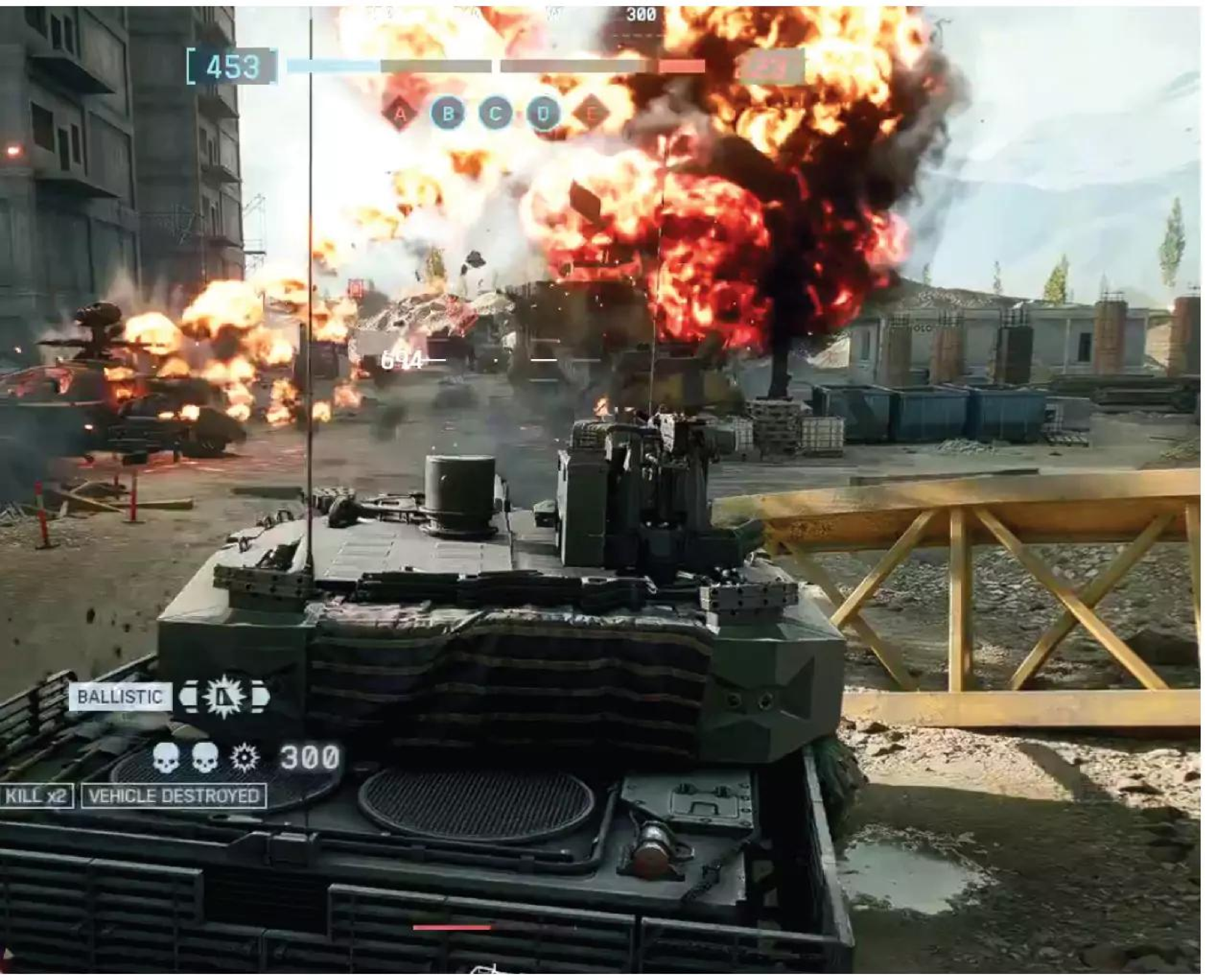
**Signature weapon:** LMG
**Primary gadget:** Supply bag
**Gadgets:** Defibrillator, portal cover, grenade net.
**Support combines the medic and ammo mule duties into one.**

### RECON

**Signature weapon:** Sniper rifles
**Primary gadget:** Motion detector
**Gadgets:** C4, target designator, decoy.
**Recons are the only class able to accurately wield sniper rifles.**


319
301
A B C D E
MAINTAIN HOLD OF MORE OBJECTIVES THAN THE ENEMY
CONQUEST
EMPIRE STATE: COLUMBIA HEIGHTS
PAX ARMATA
OPERATIONAL SQUADS: 9
MANAGE SQUAD
ZOOM
PAN
RESET CAMERA
HQ
Henry Mark V
88%
CUSTOMIZE
SUPPORT
Combat Medic
DEPLOY

DrUmSaVeR_69: I need a revive!


453
300
A B C D E
BALLISTIC
300
KILL x2
VEHICLE DESTROYED

stocks that lower recoil and a dozen scopes.

It's an indictment of the whole system that vehicle customisation is way more interesting despite fewer options. I can equip tanks with other types of rockets with different specialties (air-controlled, manual, lock-on) and make a tough choice about which support tool is best – the smoke that also counters lock-on missiles is clutch, though a self-repair is arguably better for survival.

*Battlefield 6*'s progression is slow. The first 20 levels are particularly gruelling as you unlock gadgets and guns one rank at a time, unable to focus on your preferred class' gear. That changes at rank 20, but also gets annoying in a new way: some guns and gadgets are tied to class-specific challenges that range from totally broken to mind-meltingly tedious.

## BATTLE FIELDS

Mirak Valley, New Sobek City and Operation Firestorm deliver the wider battlefields I craved in the open beta. I have qualms (especially with Sobek's restrictive boundaries and bad spawns), but in Mirak and Firestorm especially, Dice flaunts its mastery of the format it created.

They're slick, gorgeous landscapes with all the ingredients that make a map click – urban

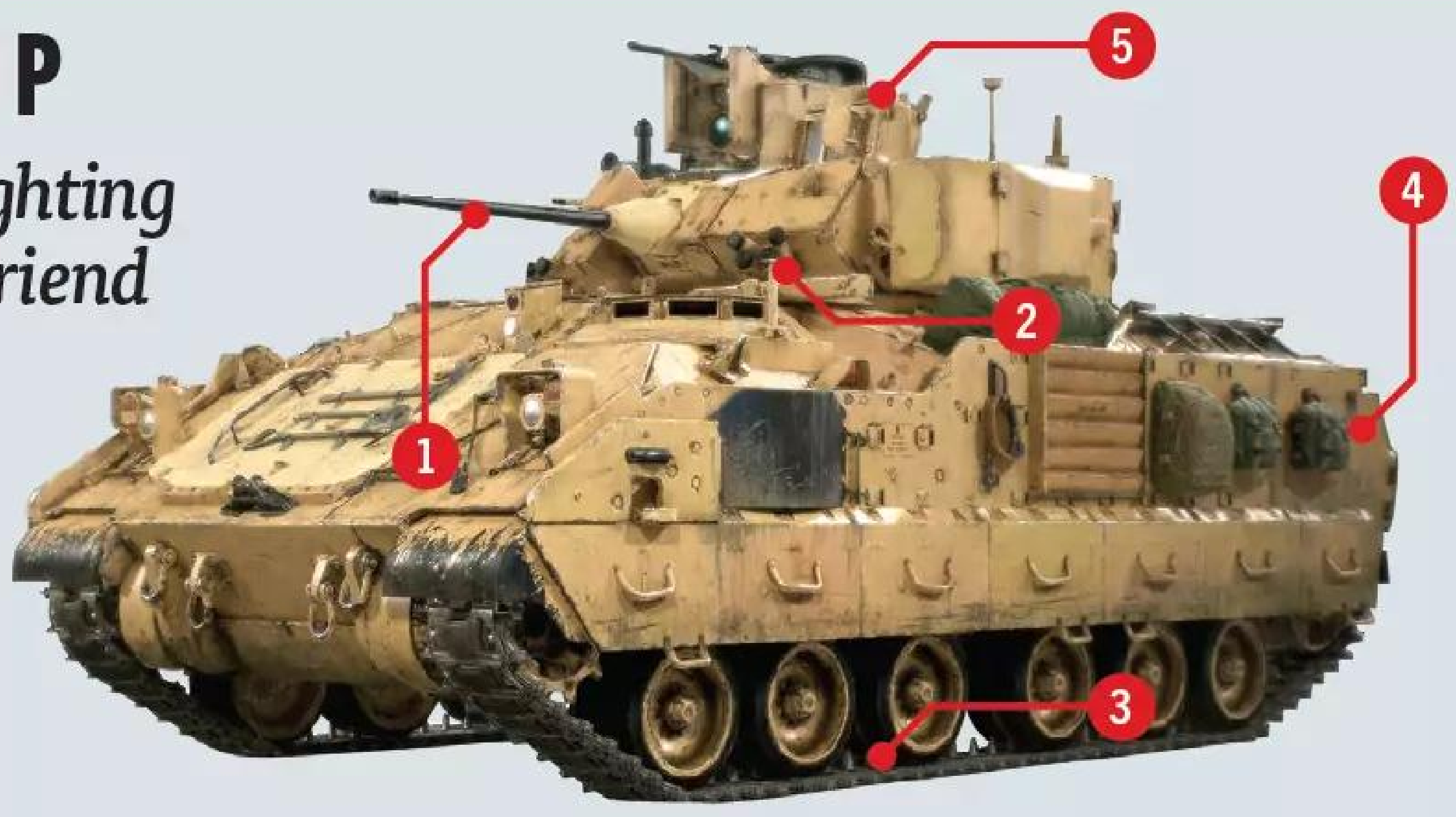
**TOP: Empire State is around the median size of *BF6* maps.**

**ABOVE: At launch, the anticipated server browser is mostly just people farming XP.**

**FAR LEFT: *Battlefield 6* is full of so many delectable explosions.**

## ARMOUR UP

*The Infantry Fighting Vehicle is your friend*



**1 MAIN CANNON** Rapid fires small explosive rounds perfect for reaching out to infantry.

**2 MISSILE POD** Can equip aim-guided rockets and lock-in missiles.

**3 TREADS** If damaged, the IFV will be immobile for a few seconds.

**4 TANK REAR** The gap in the IFV's armour. Protect at all costs.

**5 TURRET** Heavy or light machine gun operated by a second player.

cover, rolling hills, open skies, room to breathe – while managing to feel natural and lived-in. Dice's spaces stand in contrast to the maps offered in the *Call of Duty: Black Ops 7* beta, whose strict three-lane structure makes every match feel like the same sitcom set with slightly different furniture.

The problem is that there isn't enough peak *Battlefield* in *Battlefield 6*. The launch map pool of nine is overstuffed with offerings that have fewer vehicles and bottlenecks that guarantee you'll either kill or be killed every ten seconds.

**It took me almost two weeks to complete the campaign**

## THINKING WITH PORTAL

At the top of my list of 'disappointments that will probably get better at some point' is the server browser, initially billed as a convenient tool that lets us play *Battlefield 6* however we want. The reality has been the opposite: nobody has been able to create new custom servers because of a 'global server quota' caused, in part, by people grinding XP in bot matches.

The light at the end of the community tab's grim tunnel is Portal, *Battlefield 6*'s evolved toolset for modifying maps, creating game modes and publishing them for anyone to play. In a surprising move for a 2025 videogame, the Portal editor comes packaged as a branch of the open-source Godot game engine, complete with all the map files and assets needed to, for instance, recreate *Call of Duty 4*'s Shipment within a day, make a floating parkour course, or a zombie survival mode. While *Battlefield 6*'s discoverability tools are a mess, the potential of Portal itself is unbelievable.

Dice kept saying that *Battlefield 6* is obsessively optimised, and by golly, it meant it. In a time when PC performance standards have taken a nosedive, it's remarkable that an FPS that looks this good also runs this effortlessly. Much like *Call of Duty*, you can fire up *Battlefield 6* and get by on whatever it defaults to.

I split my play time between two machines at 1080p (my monitors need some updating): one running an aging 2080 Super/i9 9900KS and another with a 5090/ Ryzen 7 9800X3D. Both ran *Battlefield 6* like a dream, and I was surprised at how subtle the improvements were at ultra vs medium presets. It's hard to make this game look bad no matter how you slice it, a feat accomplished by foregoing tech like ray tracing and global illumination that tend to create more problems.

## CAMPAIGNED OUT

It took me almost two weeks to complete *Battlefield 6*'s campaign, not because it's long or particularly challenging, but because every mission is about as fun as chipping a tooth. I had low expectations for the pillar of *Battlefield 6* that reportedly suffered the shakiest development period, but I still hoped for more. Instead of thinking long and hard about how to harness *Battlefield*'s special ingredients – classes, big spaces, destruction, vehicles – into a singleplayer context, Battlefield Studios instead opted to copy Modern Warfare's homework.

The adventures of spec ops unit Dagger13 play out in a gauntlet of linear, placid run-ins with Pax Armata goons broken up by the drywall chatter of battle buddies who will never be Captain Price no matter how hard they try. If you're one of people eyeing *Battlefield 6* for its campaign, I suggest you run.

## NEXT GEN

But *Battlefield* is a shared pastime at its core, and grading on that curve, *Battlefield 6* is an imperfect success. It isn't especially innovative or surprising if you've been here a while, but its refinements in gunplay are a major leap for a series that's lagged behind where it matters most.

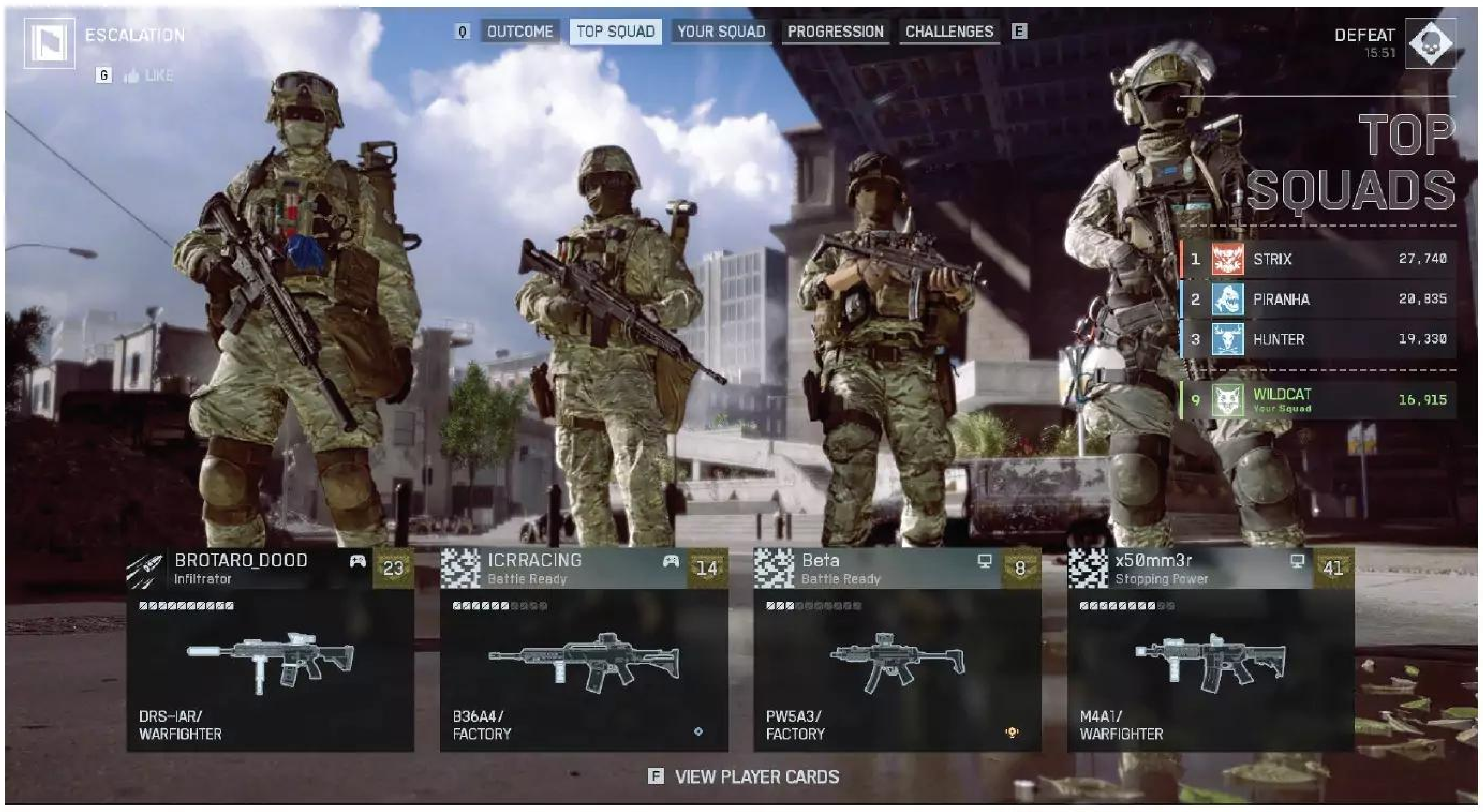
*Battlefield 6* is also the strongest piece of evidence yet that the casual FPS is cool again – people want to curate, create and modify their fun. They want community more than competition. *Battlefield 6* understands that the best FPS is a place, not just a service. The execution isn't perfect, but the heart is there. ■

## VERDICT

★★★★☆

*Battlefield 6* is more about refinements, but a well-made Battlefield is still one of the best shooters of the year.

**TOP:** ***Battlefield 6*'s campaign is mostly people yelling at each other for reasons you're not entirely certain about.**



Welcome to the juice bar.

apc
HIGHLY RECOMMENDED

**PRICE** $84.95 **PLATFORM** PC, PS4/5, XB1/S/X **WEB** tinyurl.com/APC552vampire

# Vampire: The Masquerade — Bloodlines 2

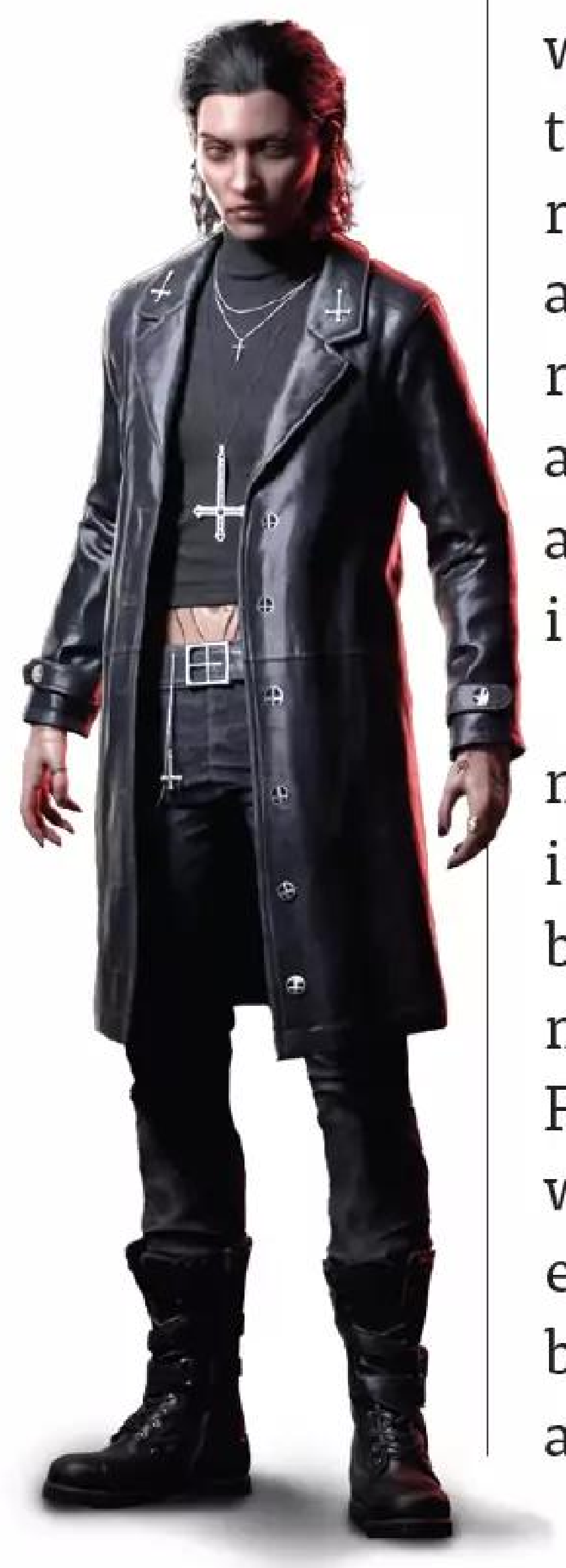
A brilliant undead mystery.

**You are Phyre, an elder vampire of prodigious strength and no small amount of fame, forced to sleep for a hundred years. And people have been waiting for your return. You wake up in 21st century Seattle, bound by a curse and weighed down by the expectations of modern bloodsuckers.**

Amid all this, you must carve out a place for yourself in this new city, along with an identity, even as you're nudged into deals and alliances, bending and adapting as you try to become what Seattle's nighttime residents need: a big scary vamp who can fix everything. Or break everything.

*Bloodlines 2* is good, sometimes even great, and it absolutely sated my appetite for a blood-fuelled undead yarn. But it is a sequel in name only, and it never really enthusiastically embraces being an RPG.

Instead, it's a conspiracy-laden mystery that's as Raymond Chandler as it is Anne Rice. You've got a lot of questions in search of answers. Chatting, rooting around and killing ne'er-do-wells: that's the gig. Your vampiric senses manifest as a kind of detective vision that highlights certain things of import: blood stains, scents, the heartbeats of mortals – that kind of thing.



There are some light puzzles, but the conundrums you deal with are primarily social ones, or big picture things, worked out in conversations with vamps, ghouls and Fabien – the voice in your head. In this regard, it's not unlike a Telltale adventure game, where your relationships and how your actions are perceived by other characters are what drives the story, and your investigation, forwards.

There's only really one thing missing from the chatty, investigative side of *Bloodlines 2*, but it's a big one: there just aren't many RPG systems propping it up. For instance, your background, which you lay the foundation for early on and then keep adding bricks, rarely plays a role. I spotted a few references, and got a couple of unique dialogue options, but that was it.

Beyond your detective vision, there's also a lack of non-combat vampiric abilities. Your powers are more action-focused, and you don't get any of the skills or attributes you'd normally associated with an RPG.

This is a game that's been designed to be a narrative adventure game with a pulpy noir bent – not an RPG. This identity crisis means that it's always just a bit awkward, with The Chinese Room trying to fit a square peg into a round hole. But it's still a miracle that, after one of the most tumultuous creation stories I've ever encountered in gaming, it even exists. Let alone that it's good. ■

## VERDICT

★★★★☆

A gripping story full of intrigue and murder that struggles to find its footing as an RPG sequel.

**FRASER BROWN**

**apc**
**EDITOR'S CHOICE**

I'm going to lose this staring contest.

**PRICE** $116.95 **PLATFORM** PC, PS5, XBS/X **WEB** tinyurl.com/APC552silent

# Silent Hill f

## Too many red spider lilies is not a good thing.

***Silent Hill f* isn't some spin-off or experiment for Konami to indoctrinate its players into performing perfect dodges – it's the next step for the iconic horror series. The new protagonist, Shimizu Hinako is at a crossroads in her life. She's plagued by the fears of heading down a path that broke her mother and sent her sister off somewhere far away. Fears of what has happened, but crucially what may come to pass, is what haunts Hinako's journey through *Silent Hill f*.**

Hinako's journey through the isolated mountain village of Ebisugaoka carries on the themes of *Silent Hill*. The layout of the town makes for some fantastic exploration as you wander around on your lonesome, squeezing through small gaps between houses and puzzling together new ways to traverse the many roadblocks which will complicate the map.

If you play on the easiest setting, Story Mode, which I did, combat is far from the core experience, even with the counter and dodge mechanics. During my first run-through, I fought everything I could see out of pure fear and panic.

I told you red spider lilies were a bad omen.

Enemies in *Silent Hill f* have quite short lines of sight, meaning turning a corner was almost always good enough to get them off my back. This turned my experience from one in which I was blindly swinging a pipe around to something slightly more thoughtful. I plotted out my route on the map, crept around corners, solved puzzles and explored every inch of the map, all while going by undetected. In doing this, I quickly got used to the dodge mechanic, which refills your stamina bar if you're able to pull off a perfect dodge.

*Silent Hill f* is a true return to form. A game that not only can stand proudly shoulder to shoulder with other Goliaths in the series, but one that is brave enough to take risks and deploy changes to set the groundwork for what I hope to be the new standard of *Silent Hill* games going forward. ■

### VERDICT

★★★★½

Proves that the horrors of *Silent Hill* aren't, and shouldn't be, restricted to the iconic American mountain town.

**ELIE GOULD**

---

**apc**
**HIGHLY RECOMMENDED**

Jesus, is there a bear or something?

You there! Stay where you are!

**PRICE** Free
**PLATFORM** PC, browser
**WEB** beyondbooleans.itch.io/snarl

# SNARL

## A horror game with bite.

*Snarl* takes place in the 1970s, and begins with two detectives in a diner, who spring to life when a father and son stumble through the doors. The dad has been injured, and there's a creepy figure standing outside the diner. When one of the detectives goes to investigate, the figure explains that he wants the boy, before revealing his horrid glass teeth and demonstrating that he means business.

The inhabitants quickly become trapped in the diner, and it's up to you, the detective, to figure out why the grey man wants the boy, and how to free the trapped diners before you all expire.

There are some clever puzzles standing between you and the multiple endings, involving items found in the diner, but soon branching out into more exotic territory.

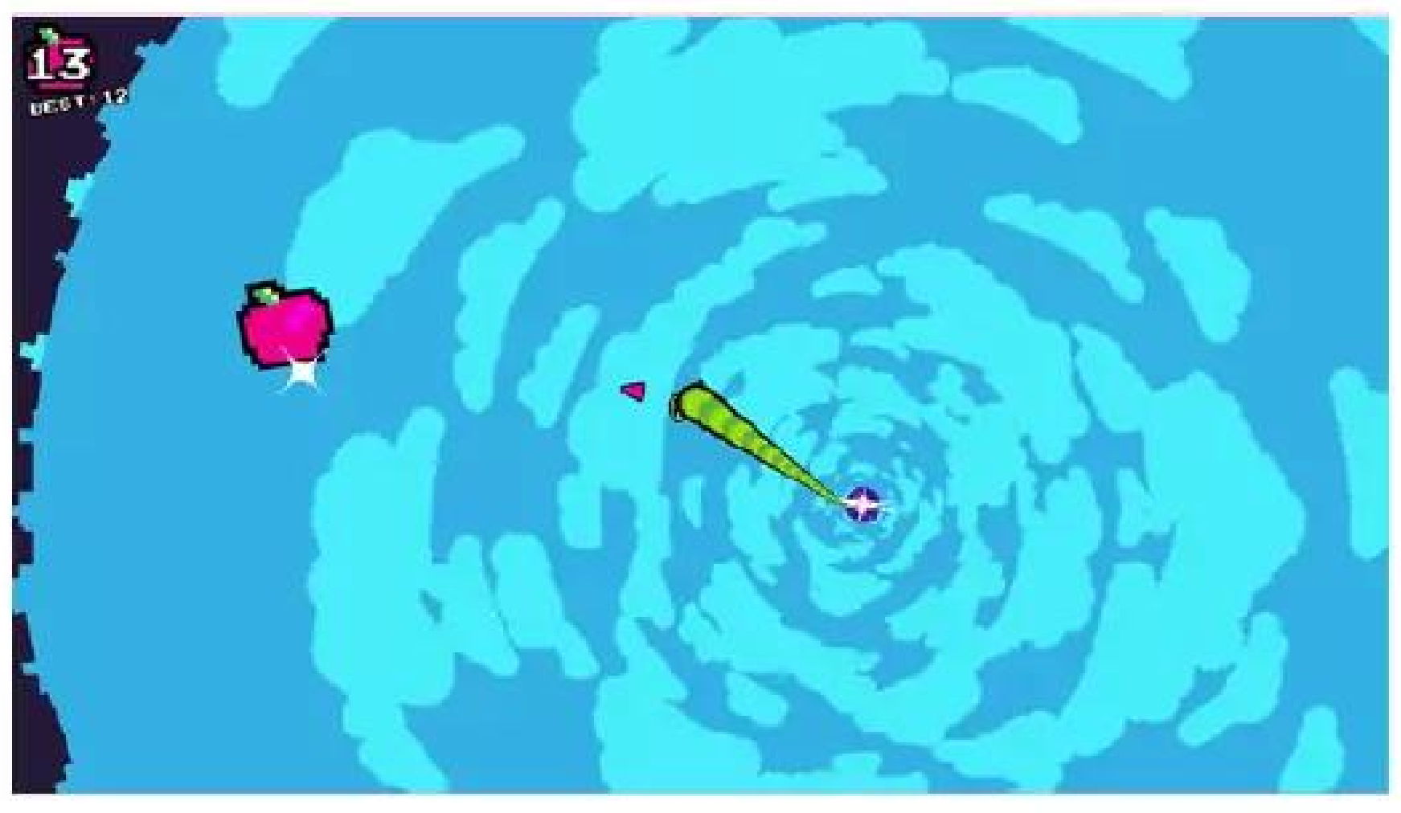
The puzzles adapt accordingly, now asking you to manhandle statuettes, and prod at glowing pustules, and assemble some leathery jigsaw skin, so yes, *Snarl* will require some fortitude in the stomach region.

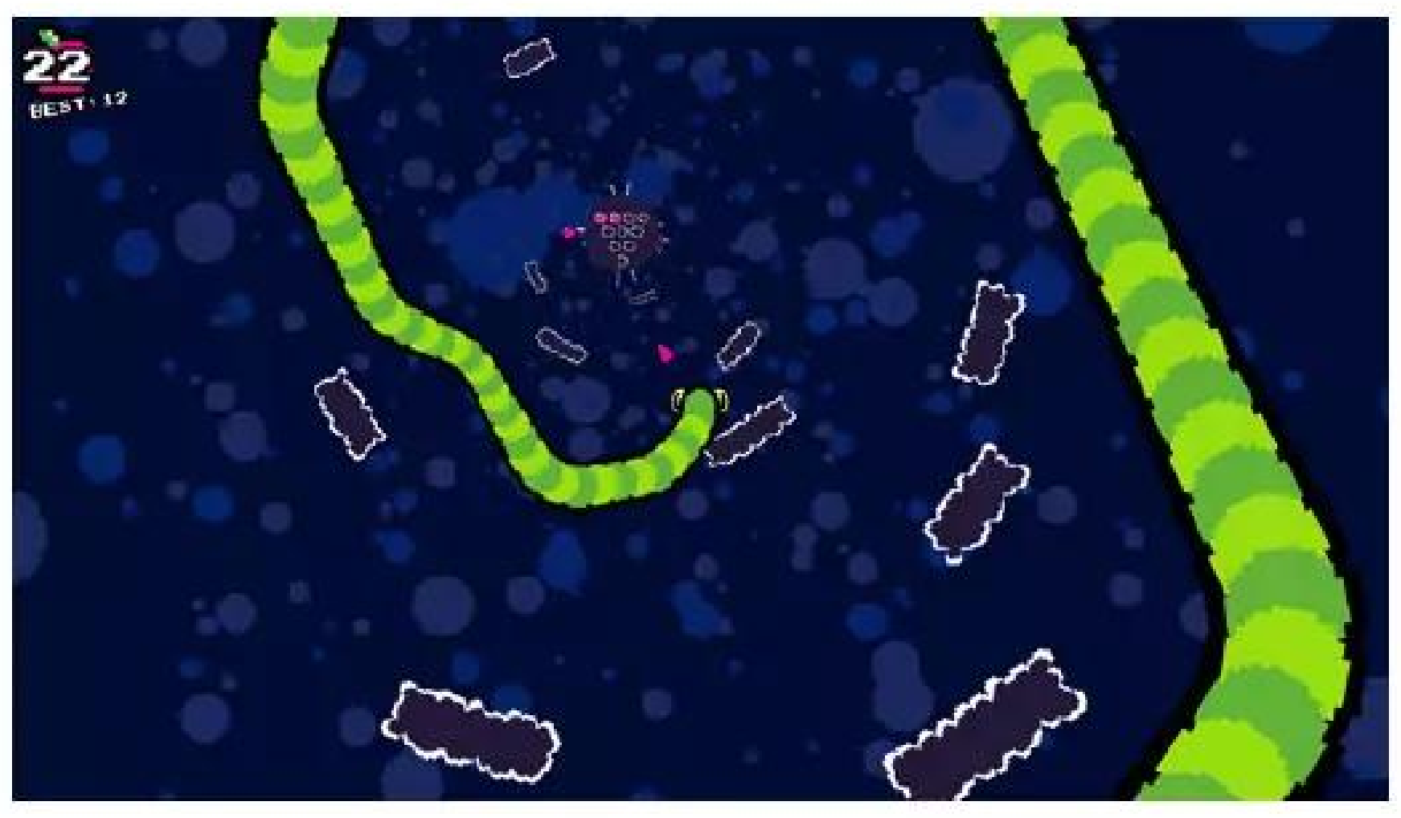
### VERDICT

★★★★☆

An adventure game that tells a creepy branching story and that doesn't skimp on the puzzles in the process.

**TOM SYKES**





**PRICE** Free
**PLATFORM** PC
**WEB** tinyurl.com/APC552snake

## DEEP SNAKE

### The phone classic gets a new dimension.

If the snake from *Snake* fell into a black hole, it would be something like *Deep Snake*. You're still grabbing fruit and growing into a bigger snake with a pesky tail, but now you're doing that while exploring a dizzying hole.

It begins simply enough, with just a bit of depth to the game space. You steer the snake by pressing Left or Right, and as you do so, it tunnels deeper, towards the centre. Sometimes the fruit is at the rim of the void, sometimes it spawns right at the bottom of it. And every time you chomp ten apples, the bottom falls off and the hole gets bigger.

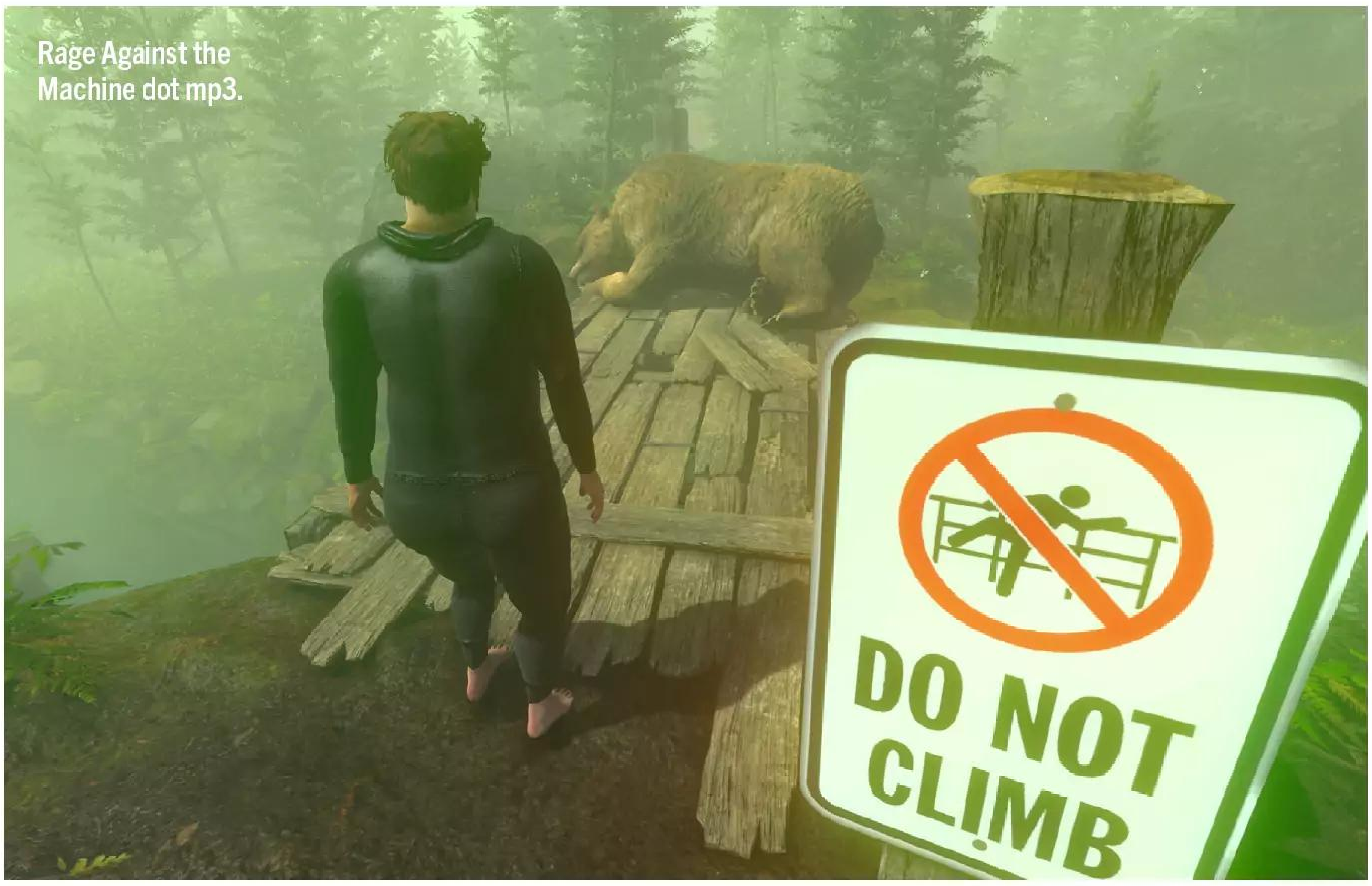
Two words to describe the effect would be 'bloody hell'. It really feels like 3D wizardry, with the bottom of the void resembling a gnat's bathroom from afar and then expanding to the size of a palace when you tunnel towards it. But the best part is shooting back to the top and watching the world shrink beneath your tail. ■

**VERDICT**

★★★½☆

Enjoy the incredible visual effect at the heart of *Deep Snake*.

**TOM SYKES**


Rage Against the Machine dot mp3.

**PRICE** $29.99 **PLATFORM** PC, PS5 **WEB** tinyurl.com/APC552baby

# Baby Steps

### The ultimate challenge is just learning to walk.

***Baby Steps* is a parody of open world games, and our collective punishment for using the phrase 'walking simulator'. You play Nate, a basement-dwelling loser mysteriously teleported from his couch to the wilderness like the Pevensie children being magicked to Narnia, only instead of plucky youngsters full of Blitz spirit you are a 35-year-old failure full of pizza.**

There's a mountain in the wilderness and maybe if Nate climbs it he'll be able to go home. It's as reasonable an assumption as any, so off you set, taking your first (baby) steps, and immediately falling on your dumptruck arse.

*Baby Steps* recommends you play with a controller like a real yakuza, so I did. Squeezing one trigger lifts your foot, pushing a stick moves that foot. You've got a fine degree of control over where that foot ends up before you put it back down, which will not save you. Nate has all the balance and grace of a moose on ice, and he's doing this hike barefoot.

In addition to the challenge of working your way from one campfire to the next as you ascend a series of zones, there are optional challenges to hurl your wobbly cheeks at. Hats are precariously placed on top of trees or broken piles, and so are lost objects to return to nearby firetowers. But every time you tumble there's a high chance you'll lose your hat or whatever's in your hand. I lost a hat when I fell through the roof of a barn and couldn't find it in all the straw, a moment so dispiriting I gave up on hats entirely and did the rest of the climb bareheaded.

Odds are you'll find at least one moment in *Baby Steps* you think crosses the line from 'funny satire of videogame design and difficulty discourse' into 'actual bullshit someone should be ashamed of'. It'll happen somewhere different for everyone, though the odds of it being one of the many bullshit moments in the sandy zone are high. ■

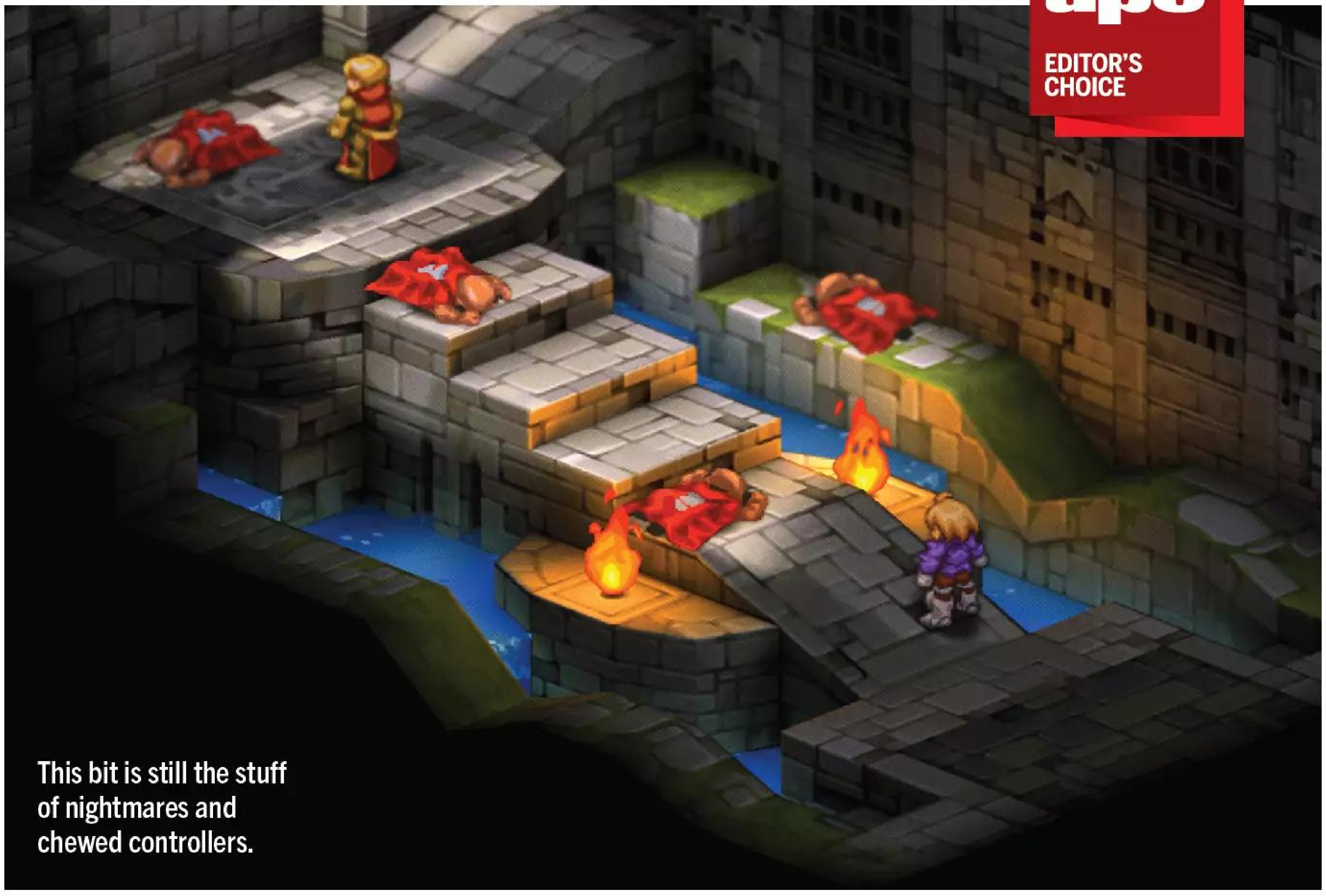
**VERDICT**

★★★½☆

*Baby Steps* is one of the funniest games I've ever played, but it is also one of the most frustrating.

**JODY MACGREGOR**

EDITOR'S CHOICE



This bit is still the stuff of nightmares and chewed controllers.

**PRICE** $74.95 **PLATFORM** PC **WEB** tinyurl.com/APC552ivalice

# Final Fantasy Tactics – The Ivalice Chronicles

A brilliant tactical treat.

**They've done it. They've actually done it: not only can I finally play *Final Fantasy Tactics* on my PC, but this timeless classic has been done justice. It's not some old game hastily shoved in an emulation wrapper and sent out to die. It's not some brand-new thing so polished and changed it feels ashamed of its heritage, either. It's simply everything I had hoped for.**

I know 'timeless classic' is an overused phrase, but I think it's the only one that accurately describes this game. It's a thrilling political and personal drama where every revelation quickly leads to another heartbreaking tragedy. It's a fantastic twist on *Final Fantasy*'s traditional job system, encouraging me to hand-craft a small team of battle-ready specialists. These halves come together beautifully, every fight part of a story, every story leading to a fight. It's no wonder so many indie PC RPGs still try to recapture its feel.

I expected the freshly recorded voice acting heard during cutscenes to be expressive, but I didn't expect the all-new in-battle lines for even generic units to bring as much personality to the game as they do. Even my opponents have new banter. A reused floating human sprite with an undead tag really does feel more believably ghostly when they open their turn with a monstrous groan instead of a voiced line. The game's better for it.

The battles themselves remain blissfully untouched: *Final Fantasy Tactics* is as unrelentingly deep as it's always been. However deep into a tough string of battles I am, I know I can always escape and come back better prepared later. Personal experimentation is warmly welcomed and encouraged, and always more satisfying than rummaging around someone else's guide for answers. Or I could swap between a trio of all-new difficulty levels any time I'm not in the middle of a fight.

Whatever draws you to the game, whether that's character builds, or political turmoil, this release is the definitive way to experience it. ■

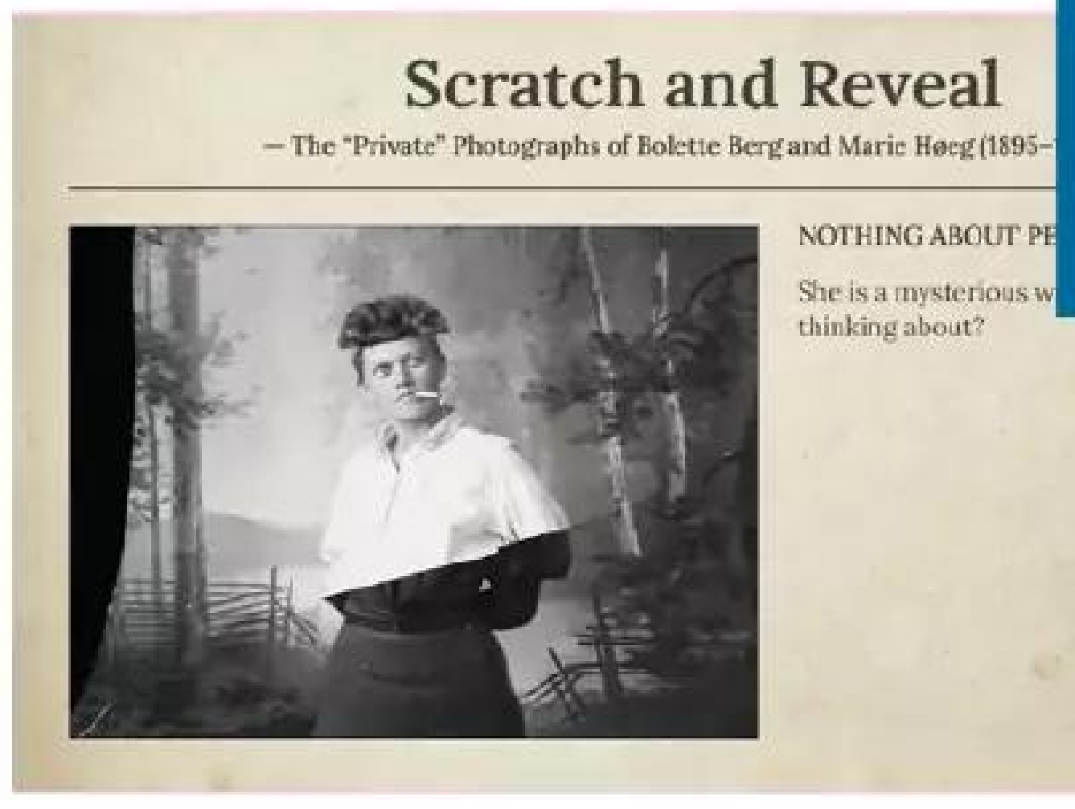
**VERDICT**

★★★★⯪

*The Ivalice Chronicles* is an extraordinary remaster of an essential RPG, and as unmissable today as it ever was.

**KERRY BRUNSKILL**

HIGHLY RECOMMENDED



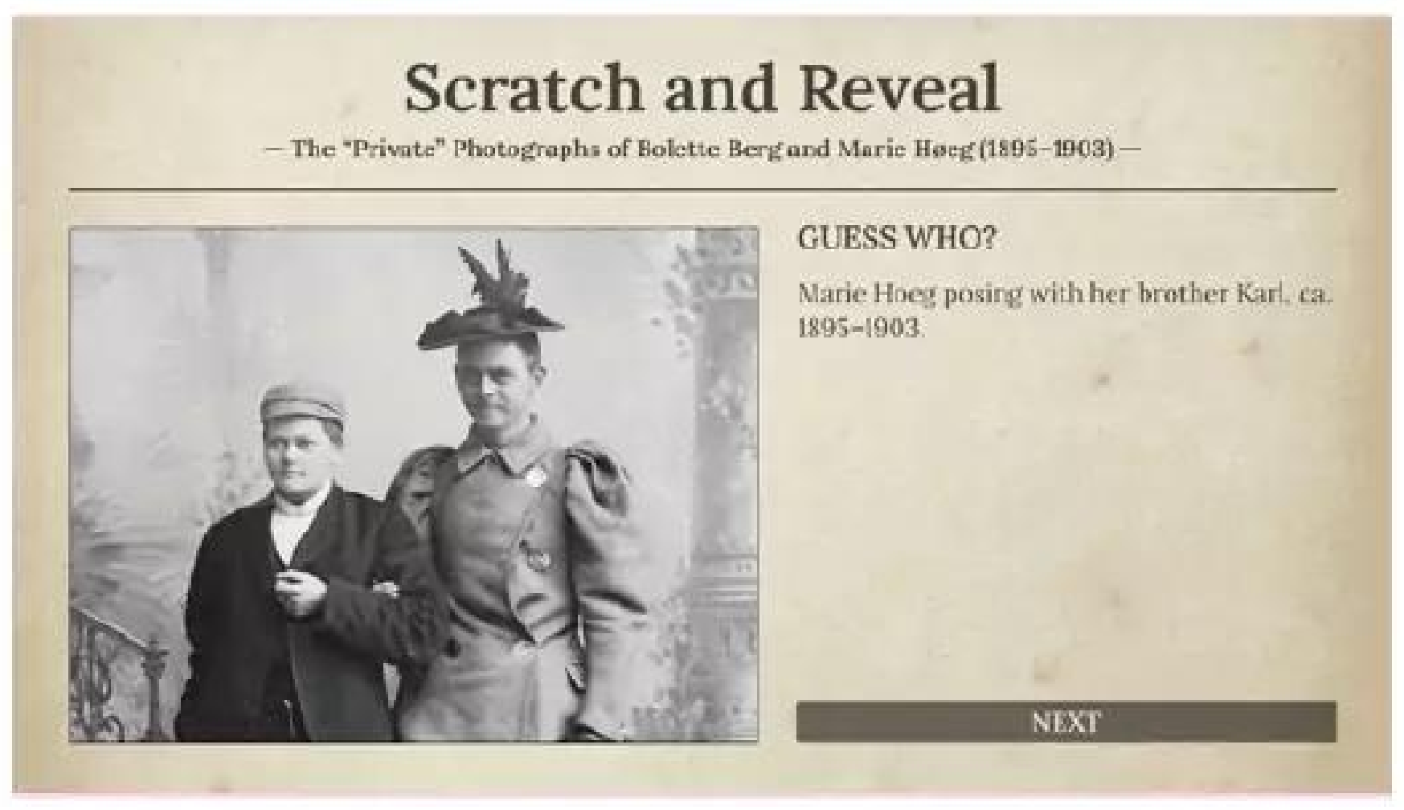
Scratch and Reveal

— The "Private" Photographs of Bolette Berg and Marie Høeg (1895–

NOTHING ABOUT PE

She is a mysterious w

thinking about?



Scratch and Reveal

— The "Private" Photographs of Bolette Berg and Marie Høeg (1895–1903) —

GUESS WHO?

Marie Hoeg posing with her brother Karl, ca. 1895–1903.

**PRICE** Free

**PLATFORM** Browser

**WEB** sgchueca.itch.io/scratch-and-reveal

## SCRATCH AND REVEAL

Challenges perceptions of gender.

In an age of increasingly fake photographs and videos, if only you could grab a coin and scratch away to find the truth of the matter. Well – you guessed it – that's the gist of the joyful *Scratch and Reveal*, which has you defacing photographs to uncover their authentic incarnations.

*Scratch and Reveal* adds another layer to the photographs – literally. In this browser game, developer Susana G Chueca has doctored the images so they are more socially acceptable, so they better reflect what we would expect from women of the Victorian/Edwardian era, and pasted them on top of the originals. This picture of Marie standing by her brother Karl, so convincingly doctored by Chueca, is in fact disguising a scandalous photograph displaying the siblings in the act of cross-dressing – Marie wearing traditionally male clothes, and Karl sporting a lovely bonnet – when you take your coin and physically scratch away at their faces.

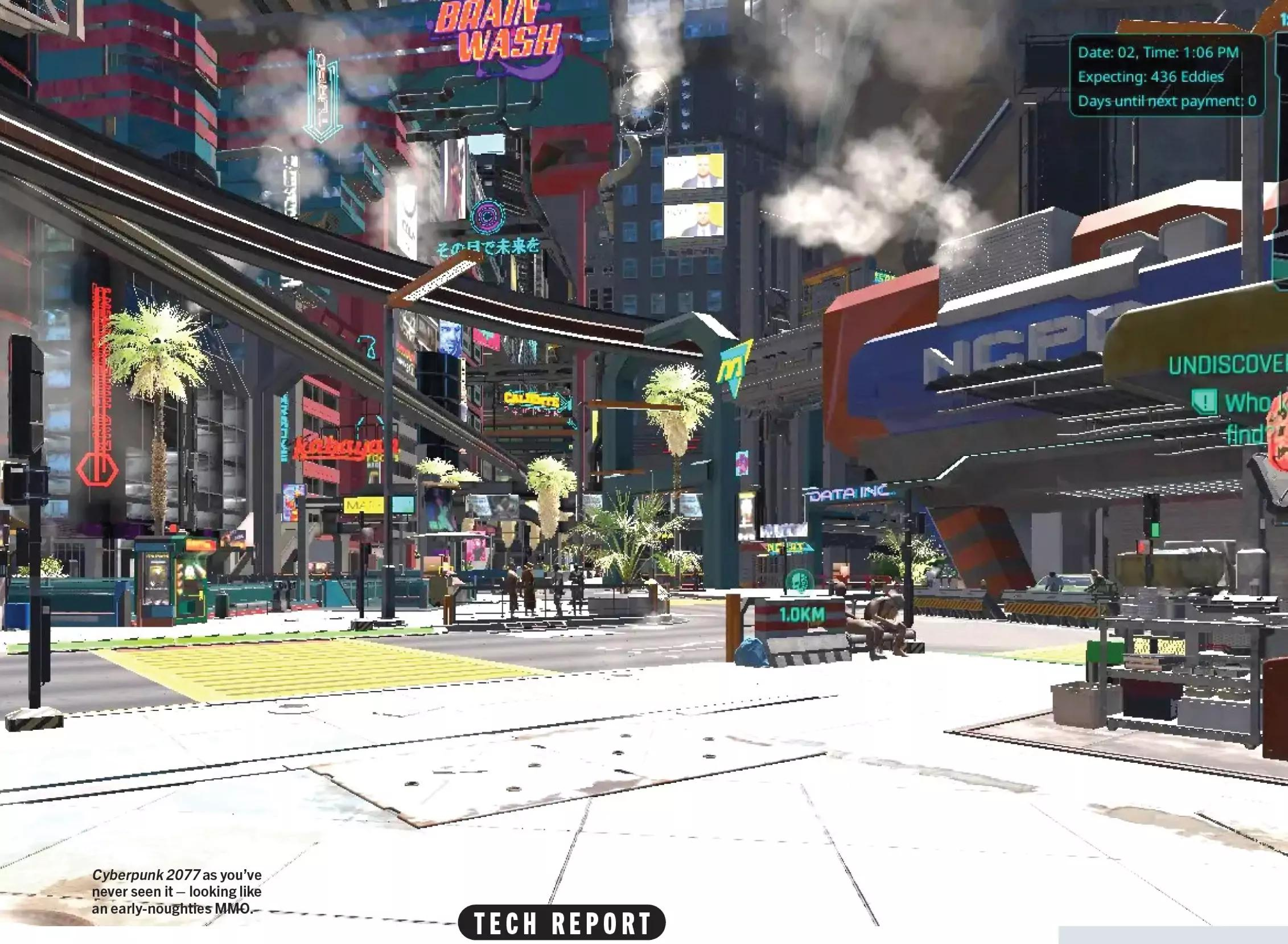
The photos were already great, but this additional layer has allowed for some sweet reveals to accompany the images. ■

**VERDICT**

★★★★☆

It's a lot of fun defacing each image to see what's been altered or swapped around.

**TOM SYKES**



*Cyberpunk 2077* as you've never seen it – looking like an early-noughties MMO.

TECH REPORT

# De-mastered

## The art of running games on rigs below their minimum specs is thriving.

**It isn't just graphics cards that cost a lot more today than they did recently. It's the same story for basically every other consumer purchase, from the games we run to make those GPUs sweat, to the teabags that sustain us during that vital scientific testing, and the electricity used to boil the kettle – as has been well documented, it's all gone through the roof.**

But this is PC gaming. A subculture whose very origins are founded in the art of bending hardware to our will, making it do things it wasn't designed for. The first home computers weren't for gaming, they were for doing boring things, like looking at numbers. If they were meant for fun, they wouldn't have manufactured them all in hearing-aid beige.

Playing games on PCs was a subversion of their purpose, and many decades later you can almost hear the echo of that original sin as we subvert our hardware once again – this time to run games on components below the minimum requirements. That's not a comprehensive answer to the current and ongoing cost of living crisis, but in the absence of any sensible price adjustments from component manufacturers (or any particularly bright fiscal stimulation strategies from national governments), running *Battlefield 6* on an old laptop is the best answer we have at this time.

### A LOW BAR

Head over to Reddit and go on /r/lowendgaming and you'll be struck by a few things. Firstly, that a community of people has been helping each other to run games on inexpensive and outdated PC hardware for many years, long before all the insidious price hikes we're enduring today. And secondly, members of that community have been doing so with no small amount of ingenuity.

A typical exchange in that subreddit goes like this: a user states their hardware and asks for recommendations they should play, or whether a particular title will run on their machine. In the replies, people assure them that they managed to get *The Witcher 3* on medium settings running on a relatively basic array of elastic bands and wooden pulleys. The prevailing sentiment is that minimum requirements are over-cautious, that modern games running at their lowest graphics settings still look more than decent enough to constitute playable, and that maybe there's no such thing as a PC that's too old or underpowered. Intrigued, I decided to test out the theory.

Somehow – perhaps I'd been Derren Brown-ed by the aforementioned subreddit with the power of subliminal suggestion – I picked *The Witcher 3* as my test subject, and immediately found a small subculture of modders

### United they stand

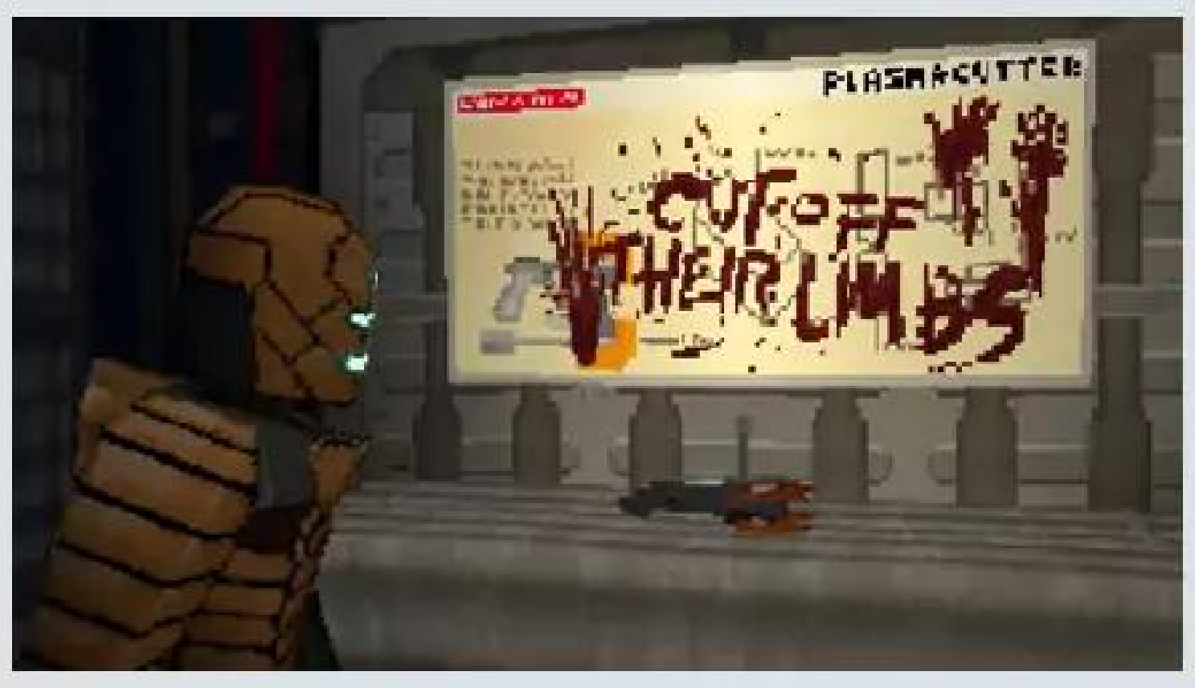
De-making games isn't all about unlocking performance on older systems. There's also an element of art for art's sake, the pure joy of seeing a new title imagined using the rendering techniques – and often game mechanics – of yesteryear. That's at the heart of the de-make movement, which has spawned many titles on itch.io and troubled many an IP lawyer. Right now it's PS1 era, low-poly visuals that are in vogue. Give it ten years, and indie creators will be purposefully recreating the look of *Far Cry 3* for ironic effect.

Image credit: Getty

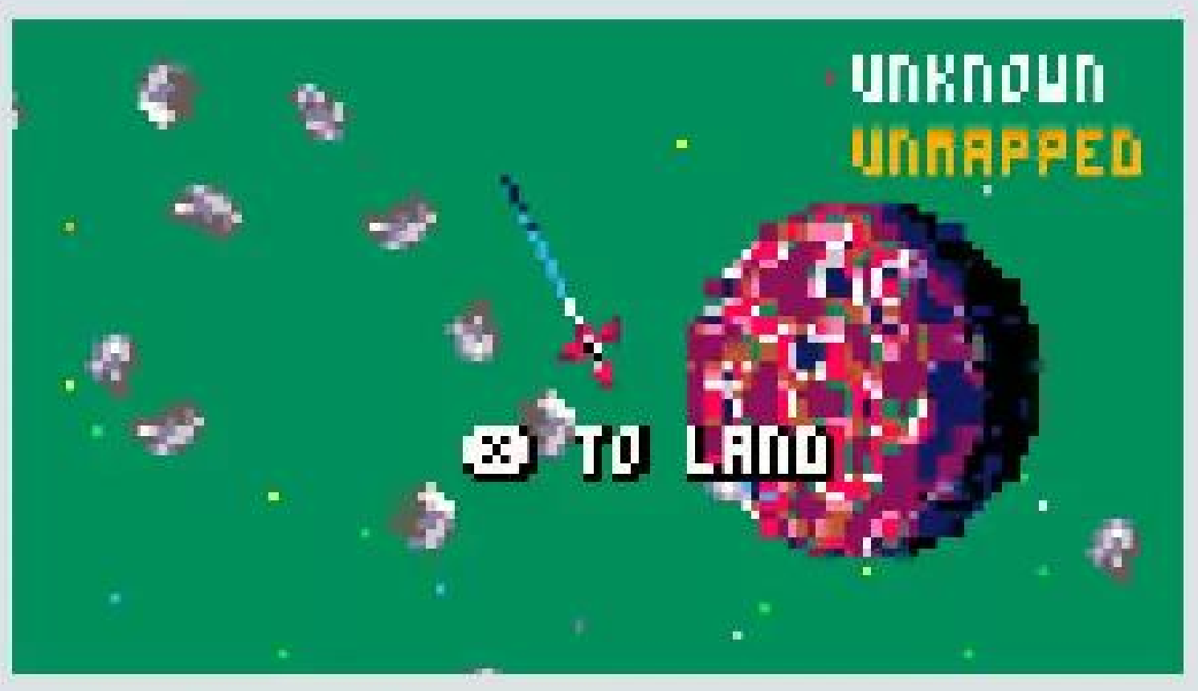
**FAR LEFT:** Might be worth dropping the graphics preset down to medium on this beauty.

**LEFT:** An alternative solution: throw money at your system until requirements are irrelevant.

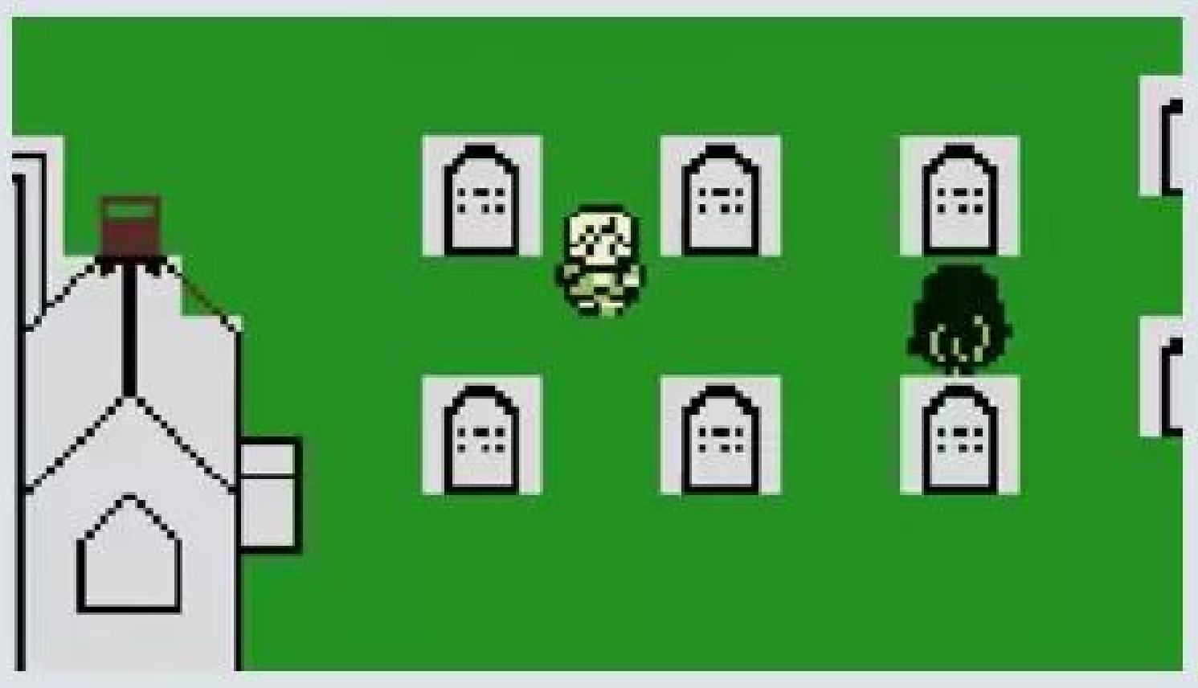
## NEWLY OLD *Four de-make projects that take visuals back to basics*



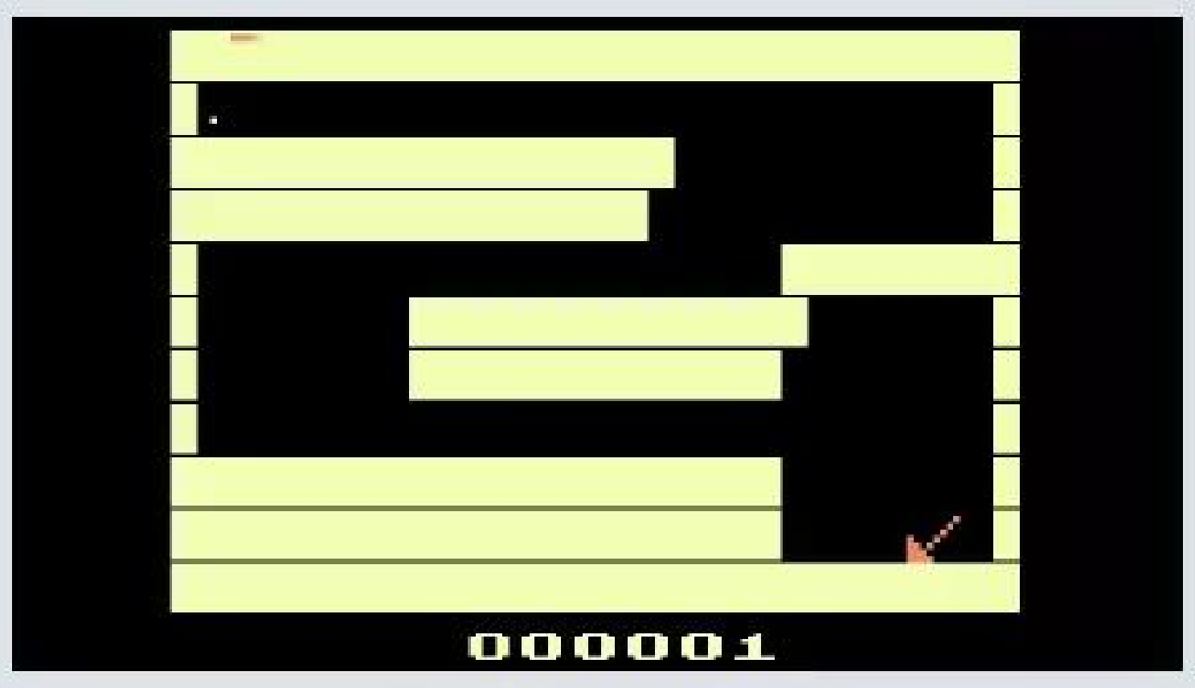
**DEAD SPACE DMAKE**
What's scarier than a spaceship full of monsters? Surviving it in 2001-o-vision.



**LOW MEM SKY**
A lot like Hello Games' mind-meltingly vast space sim, but 16bit. Runs in a browser.



**SILENT HILL 2 20TH ANNIVERSARY DEMAKE**
A masterpiece about guilt and grief, only it's a Game Boy RPG now.



**SUPER 3D PORTALS 6**
Valve's physics-defying masterpiece, expressed as an Atari 2600 puzzler. That's pretty neat!

whose favourite pastime is creating the lowest graphics settings possible for it. Lowering all the in-game options to their minimum values was only the beginning of the journey, I learned. How did the game look at this mid-point of its de-make? It looked… very playable. This is a decade-old title we're talking about and even maxed-out Geralt is showing a few crows' feet these days, so at the lowest settings the assets have nowhere to hide. Lighting looks perfunctory. Textures look a bit PS3.

But the overall sense of the world's there. There's life in Velen, in the NPCs' routines, the drama of its geography, even without especially complex lighting or sharply drawn assets. But things were about to get way more basic before I was through with CD Projekt's labour of love.

> **THE SENTIMENT IS THAT MINIMUM REQUIREMENTS ARE OVER-CAUTIOUS**

The Ultimate Graphics Options Mod by marvelmaster allows for much more tweaking than the game's front-end presents. It's basically a nicely packaged editable .ini file, and in here you can control everything from grass draw distance to NPC count, how long decals appear for, and how many of them appear at once. And when you turn everything down that can be turned down, *The Witcher 3* looks so basic, it almost starts to become beautiful again.

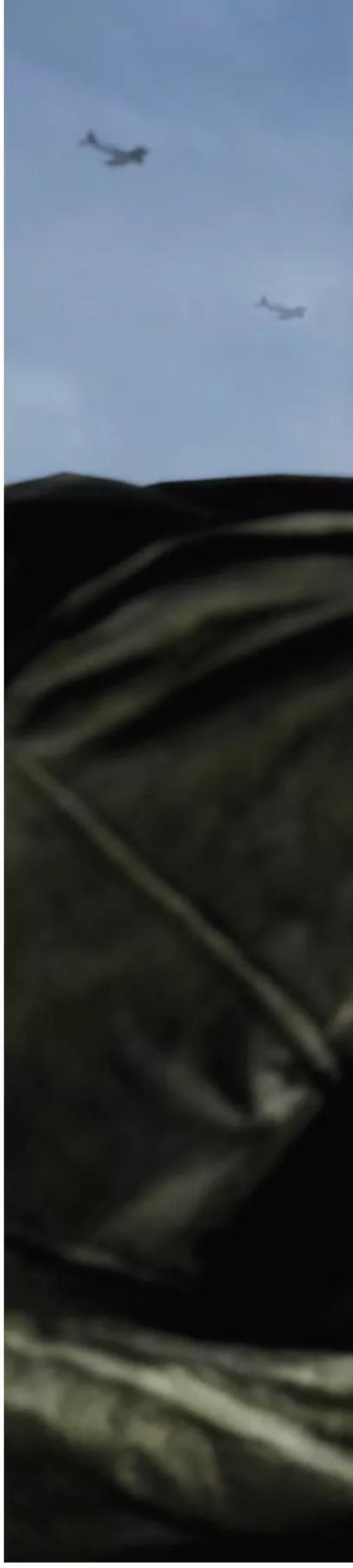
### UNDERCLOCKING

On a surface level it's fun to see how far you can push a game's visually, in the opposite direction than we're used to as PC gamers. The end result looks very different, but the intrinsic enjoyment's the same: taking control of your software environment, and making your game look and run the way you want it to. But it's also tremendously useful to have a graphics mod like this if you're playing on old machinery, of the kind that barely passed *The Witcher 3*'s minimum specs back in 2015.

### VARIETY OF PARAMETERS

I dug deeper. Was there a similar mod for *Cyberpunk*? There was. It was, and indeed is, called More Graphics Options – Performance Boost for Potato PC, and I can't think of a better way to sum that up. Another editable .ini packaged up into a friendly front-end which allows a far greater variety of parameters to be tweaked than *Cyberpunk*'s already formidable graphics options menu does. The result is a less shiny Night City, but one that would run well on hardware which would otherwise struggle to yield playable frame rates. YouTuber Blunty managed to use the mod to get Cyberpunk working on a Ryzen 5 3400G, using its integrated AMD Vega 11 GPU, for example. To see the famously demanding title running on such inexpensive and veteran hardware is a big win.

Until the world of hardware componentry stops being so frankly silly as it is currently, de-making games is a genuine solution. Track down mods that offer more graphics options than your chosen game's front-end, and make friends with the .ini files in your install directory. Bringing down the visual options below their intended minimum really does let you run titles on systems below minimum specs. If your current rig dies and you're left with an older backup machine or the prospect of buying replacement parts for inflated prices, the de-make route could save you hundreds. ■ ***Phil Iwaniuk***



TECH TALES

# War photographer

Capturing a game's visual beauty by sticking to spectator mode.

**A lot of games hardware marketing focuses on performance. Esports-ready mice and keyboards. High-refresh-rate monitors that promise you'll see the enemy faster and aim more accurately. Even in graphics hardware, extra frames and faster performance are generally the basis of any purchase argument. But I think that messaging misses a crucial aspect of what it is to have a powerful PC: sitting back and taking the time to enjoy the visuals. Letting the game happen, instead of imposing your will on it.**

With *Battlefield 6* looming large at the moment, casting its complex, soft-edged, anti-aliased shadow over all of PC gaming, it's especially handy to keep that philosophy in mind. There's more than one way to enjoy a *Battlefield* game's visuals, and I'd argue the best way of all is to put the guns down entirely and embrace spectator mode.

I first tried it when *Battlefield V* arrived. It was one of the first wave of games to take advantage of Nvidia's new ray-tracing tech, marketed at the time as CG movie-like lighting which would previously take Hollywood studios days to render but magically now ran in real-time. And as it happened I'd just obtained an RTX 2080 Ti, the flagship card of Team Green's new ray tracing-focused GPU gen.

Ray tracing was subtle back then in 2019. Developers hadn't started spamming rainy alleyways filled with neon signs yet, so it wasn't always obvious where and when ray tracing was happening. That RTX 2-series gen wasn't as adept at calculating the zillion directions in which light might bounce as today's 5-series, either, so developers were more restrained about how they implemented it.

It was hard to find a spare minute during the desperate fight to stay alive in Iwo Jima, Wake Island or Halvøy to appreciate the way a fighter plane reflected across a car bonnet, or to observe a grenade explosion in a muddy puddle.

### EYE IN THE SKY

So instead I entered *Battlefield V*'s spectator mode. It's generally not a doorway I darken in any game that offers it, but the stars had aligned on this occasion – I had a new GPU and I wanted to see exactly what it could do, and a game that was blessed with an unnaturally rigorous suite of camera options in spectator mode sounded perfect.

I can confidently say I spent more total hours in that mode than actually playing *Battlefield V*. At the start it was just about identifying the bits in each map where ray tracing was most visible – a marble floor in a ruined bank in the Devastation map was a particularly good spot – but afterwards, I started to look at the whole experience differently.

The satisfaction to be found in this sweaty online shooter, as far as I was concerned, was in capturing a really artful tracking shot. Finding a nice juicy battle, setting myself up at just the right angle with the freecam, and using deft controller inputs to induce smooth, cinematic camerawork.

Six years later I feel the same way about *Battlefield 6*. More than a chance to prove my twitch aim or tactical nous, it's an opportunity to see what today's graphical architecture can muster in a virtual videographer's sandbox. The battles won't ruin my weekend or have me throwing peripherals across the room in a gamer rage, because I won't be in them. I'll be hovering above you like a voyeur, fiddling with camera sliders and

I HAD A NEW GPU AND I WANTED TO SEE EXACTLY WHAT IT COULD DO

**Phil Iwaniuk**

In between writing for *APC*, self-proclaimed 'virtual war photographer' Phil spends his time documenting online battles. His work on the 2fort massacre in *Team Fortress 2* is especially harrowing.

## SAY CHEESE AND DIE *Four of the best photo modes in PC gaming*

**HORIZON: ZERO DAWN**

Sony's PC ports have a consistently high standard when it comes to taking snaps, and it all started with Aloy's first jaunt.

**GHOST OF TSUSHIMA**

Unsullied 13th-century Japanese countryside, a feature-rich camera, and only the occasional risk of decapitation.

**RED DEAD REDEMPTION 2**

Whereas actual frontier-era photography involved sitting very still for nine hours, RDR2's camera options are bleeding-edge.

**NO MAN'S SKY**

If ever there was a universe worth photographing, it's one in which giant land-dwelling jellyfish-stegosaurus hybrids occur.

**ABOVE:** Being pounded by artillery fire really minimises the opportunities to take in the scenery.

**BELOW:** *Skyrim* photography is a pastime as old as these trees. They're really old.

time-of-day settings, with a low heart rate and a sense of graphics-induced serenity.

### PIXEL PAPARAZZI

I know it isn't just me who plays games this way, because in the last few years developers have been pouring ever-more love and attention into their in-game photo modes. It's far from a new trend, and those with long memories and long-dormant tumblr accounts will remember the good old days when *Skyrim* photography was all the rage. ■

***Phil Iwaniuk***

MOD SPOTLIGHT

**RELEASE** Sept 5, 2023 **DEVELOPER** Bethesda Game Studios **PUBLISHER** Bethesda Softworks **WEB** bethesda.net

# Star Wars Genesis

This full conversion is the perfect excuse to return to *Starfield*.

**Christopher Livingston**

**No one is more surprised than me to report this bit of news: it's 2025 and I am playing *Starfield* again. To be clear, I'm not saying I didn't like *Starfield* when it launched in 2023. I did like it, and I played it for more than 100 hours! I just thought I was finished with it. It's a good game, but it's light years removed from the sort of staying power held by Bethesda RPGs like *Fallout 4* or *Skyrim*.**

Less of a surprise: it's a cool mod that finally brought me back to *Starfield*, or to be more specific, a collection of several hundred cool mods that together form *Star Wars: Genesis*, a full conversion modlist that transforms *Starfield* into a big hunk of the Star Wars galaxy. Want to join the Imperial Navy and fly a TIE Fighter for the Empire? Want to pal around with R2D2 and make the jump to lightspeed in the Millenium Falcon? Want to race an X-34 landspeeder across Tatooine and fight some Tusken Raiders? You can do all of that in *Star Wars: Genesis*, and more.

Even the character creator feels like it's breathing new life into *Starfield*, because you can play as all sorts of alien races: Rodians (like Greedo), Trandoshians (like Bossk), Duros (the blue-headed dudes from the Mos Eisley cantina), Mon Calamari (it's a trap!), and a bunch more. Yes, you can even be a Gungan, if your dream has always been to inhabit Jar-Jar Binks. Just seeing all these alien character options makes me scratch my head at Bethesda's choice to go humans-only in

*Starfield*. The company that made us fall in love with Argonians and Khajiit could have invented some awesome aliens, couldn't they? What a bizarre choice.

### TATOOINE MACHINES

You can also choose your starting point, and it doesn't involve walking around in a tunnel mining ore for 30 minutes. Do you want to follow the main storyline, which, like *Starfield*, involves your discovery of a strange relic? If so, you can begin the game in the iconic city of Coruscant (which is standing in for *Starfield*'s New Atlantis). You can also begin in an Imperial-controlled system like Geonosis or Port Haven, a rebel stronghold like Dantoo Town, or even just a random spot in the galaxy, if you're really daring.

There are loadouts to pick from too: start as a smuggler, stormtrooper, rebel pilot and even a bounty hunter or random citizen of the galaxy. All the *Star Wars* weapons and vehicles you could dream of are here in *Genesis*: Han Solo's heavy blaster, Boba Fett's carbine rifle, Chewie's Bowcaster, and dozens more. Buy, fly and modify the Falcon, X-Wings, TIE Fighters, and even those sleek and shiny Naboo starships. Walk through any space port or look through a vendor's stock and you'll immediately say, "Ooh, I want that bit of *Star Wars* technology".

> "A collection of several hundred cool mods that together form *Star Wars: Genesis*, a full conversion modlist that transforms *Starfield* into a big hunk of the *Star Wars* galaxy."

I played as a Bith, one of those lightbulb-headed alien musicians from the cantina in A New Hope, naming myself Boba Fret (get it? Music? Fret? OK, it's not my strongest work). I stuck to the main story for a bit, but it's hard not to glance at the huge star map and want to peel off and go exploring. I quickly jumped my way over to the Tatoo system and landed at Mos Eisley, which I think old Ben Kenobi oversold as a wretched hive of scum and villainy. It's a really nice place, honestly! Even for a lapsed *Star Wars* fan, just strolling around the spaceport is delightful, spotting a gonk droid here or a Bantha there, seeing an Ithorian (those hammerhead aliens), spotting a dewback (the stormtrooper's ride of choice in the desert), being greeted excitedly by a small pack of Jawas. What a hefty dose of nostalgia this modlist is, and what a welcome change from the mostly generic sci-fi feel of *Starfield*.

### HYPER SPACES

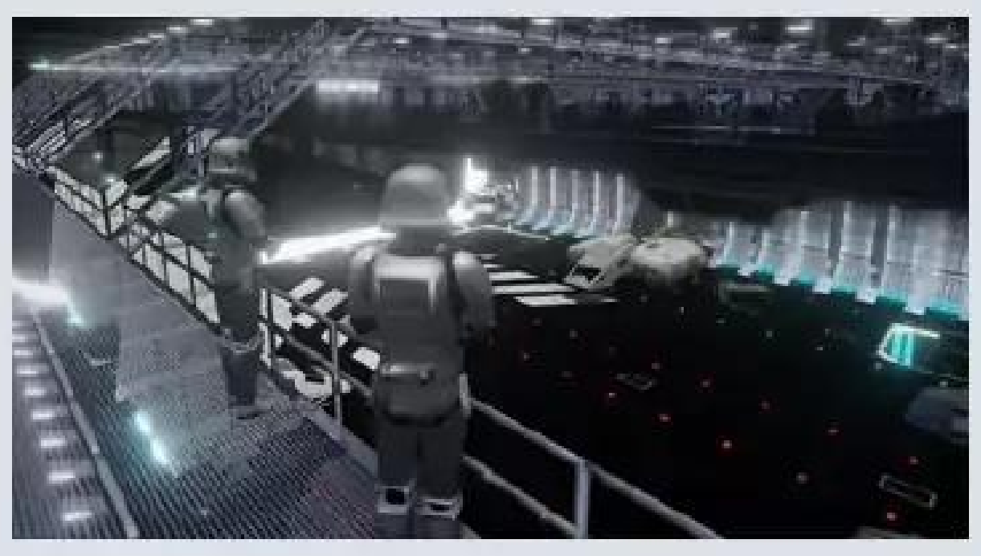
It's not just a bunch of cosmetic changes, either: there's definitely been some tweaks to combat. While tearing across the Tatooine desert in my X-34 landspeeder (the same one Luke drove), I ran into an Imperial mining station guarded by several stormtroopers. I happily engaged them with my DL-44 blaster, but these troopers were no pushover. Sure, a good headshot will drop an enemy quickly, but you're also no laser-sponge yourself. The combat is what I'd call tough but fair. You do a reasonable amount of damage to enemies, but they do the same to you. Our favourite *Star Wars* heroes may have plot armour, but you don't. I like it. It makes me think twice before I begin popping off at every Imperial I see.

Space travel is bursting with *Star Wars* stuff, too. After buying a Corellian YT-1300 light freighter (the Falcon, in other words) I was jumping around between systems and I wound up in orbit around an Imperial-controlled planet. Star Destroyers closed in on either side of me. They didn't attack, but it sure felt like a real *Star Wars* moment to me. Awesome.

I won't lie and tell you *Star Wars Genesis* is an easy download and install. I mean, I could, but then the reality of the experience would see you soon get mad. You're looking at more than 50GB of files on top of *Starfield*'s 100GB, and there's a long, long list of instructions you'll have to follow precisely or the mods won't run. Even with the excellent modlist manager Wabbajack, it's a bit of a beast to get up and running, but it's absolutely worth it. It got me to do something I'm not sure I ever would have done otherwise, though: play *Starfield* again. ■

## CONVERT ALERT

*Other Star Wars total conversion mods*



**TIE FIGHTER TOTAL CONVERSION**

A brilliant recreation of the original TIE Fighter in *Star Wars: X-Wing Alliance*.

**STAR WARS CONQUEST**

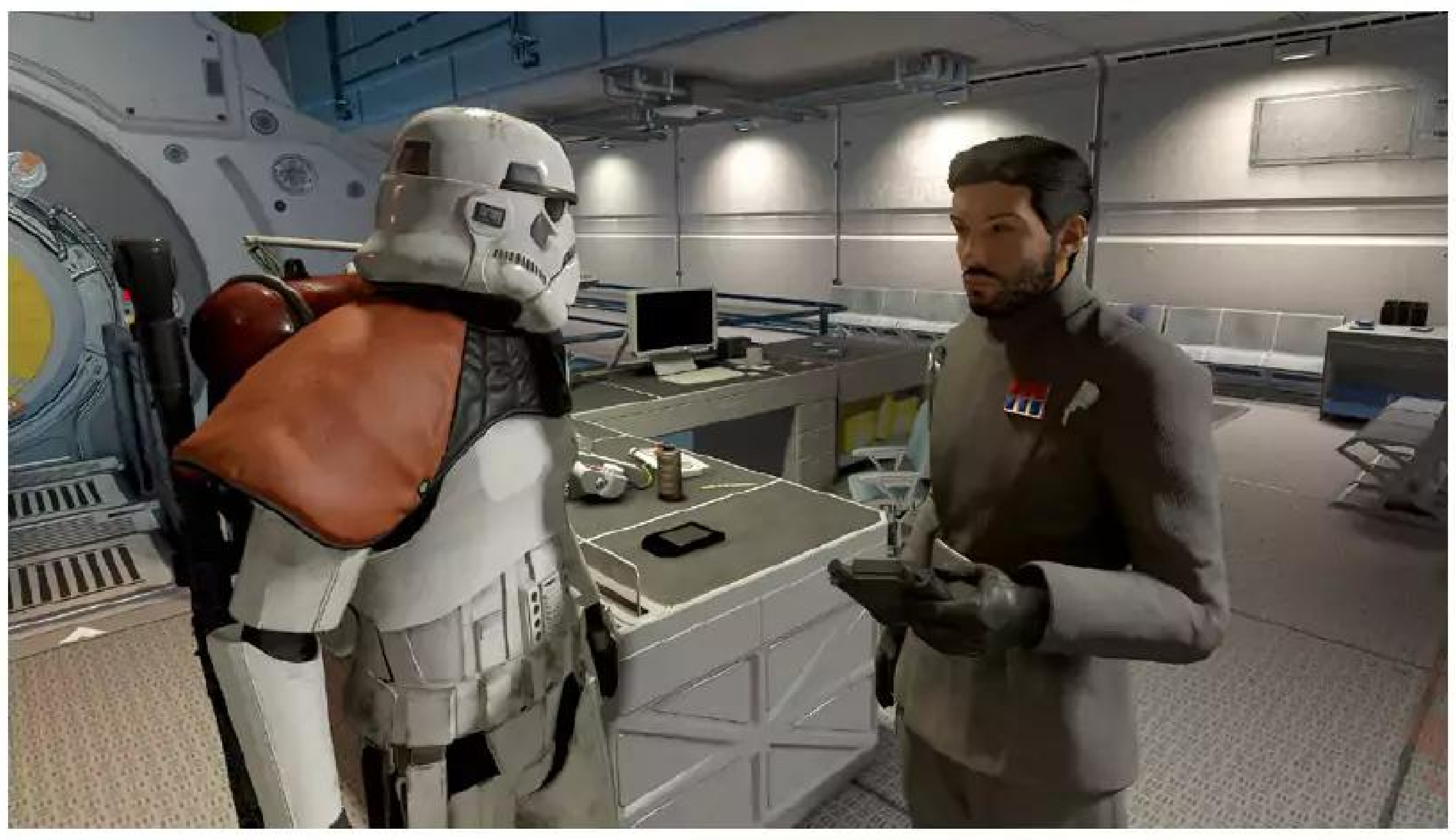
You wouldn't expect *Mount & Blade: Warband* to be the perfect sandbox for a *Star Wars* mod. But it is.

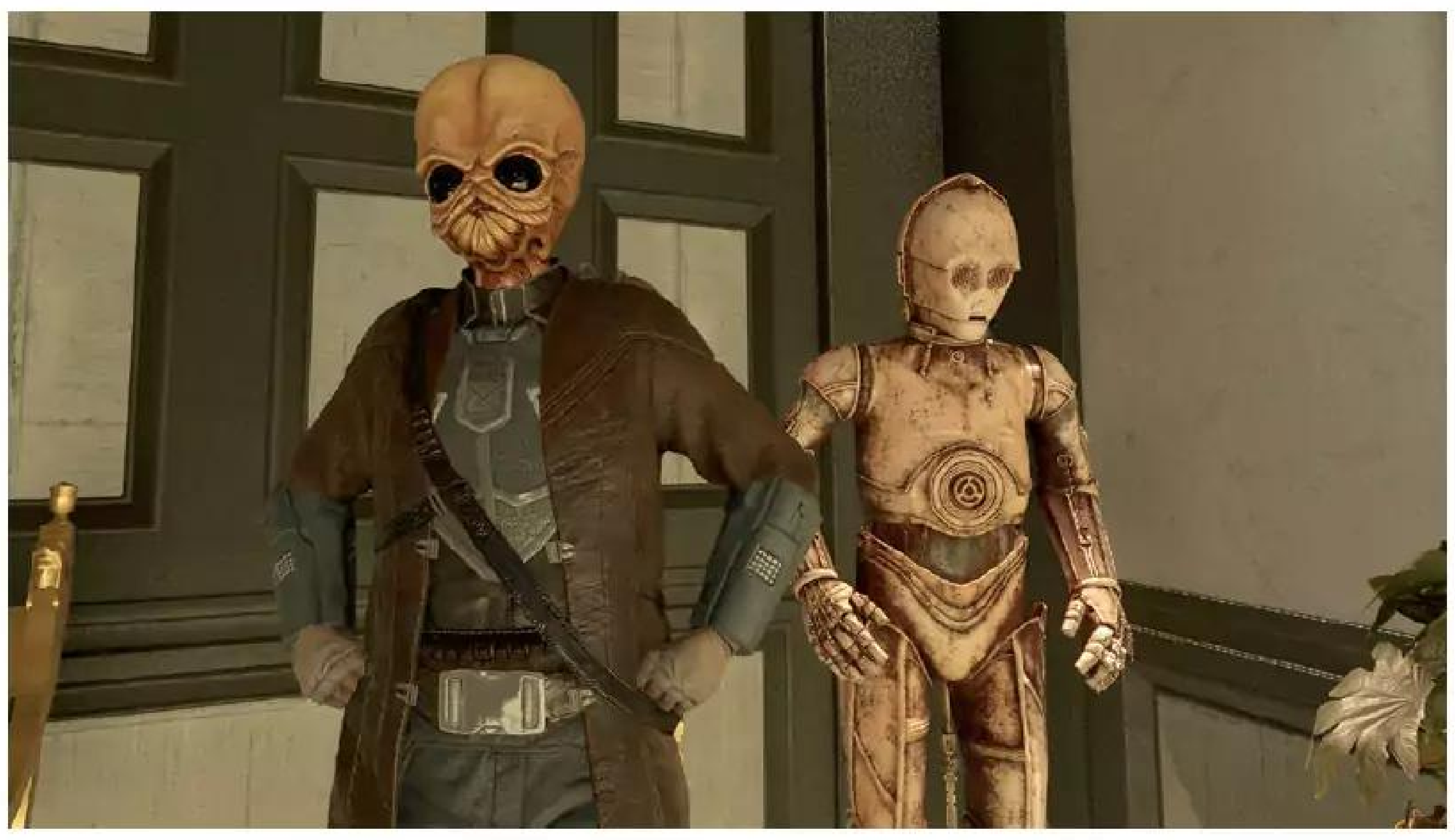
**STAR WARS NEW DAWN**

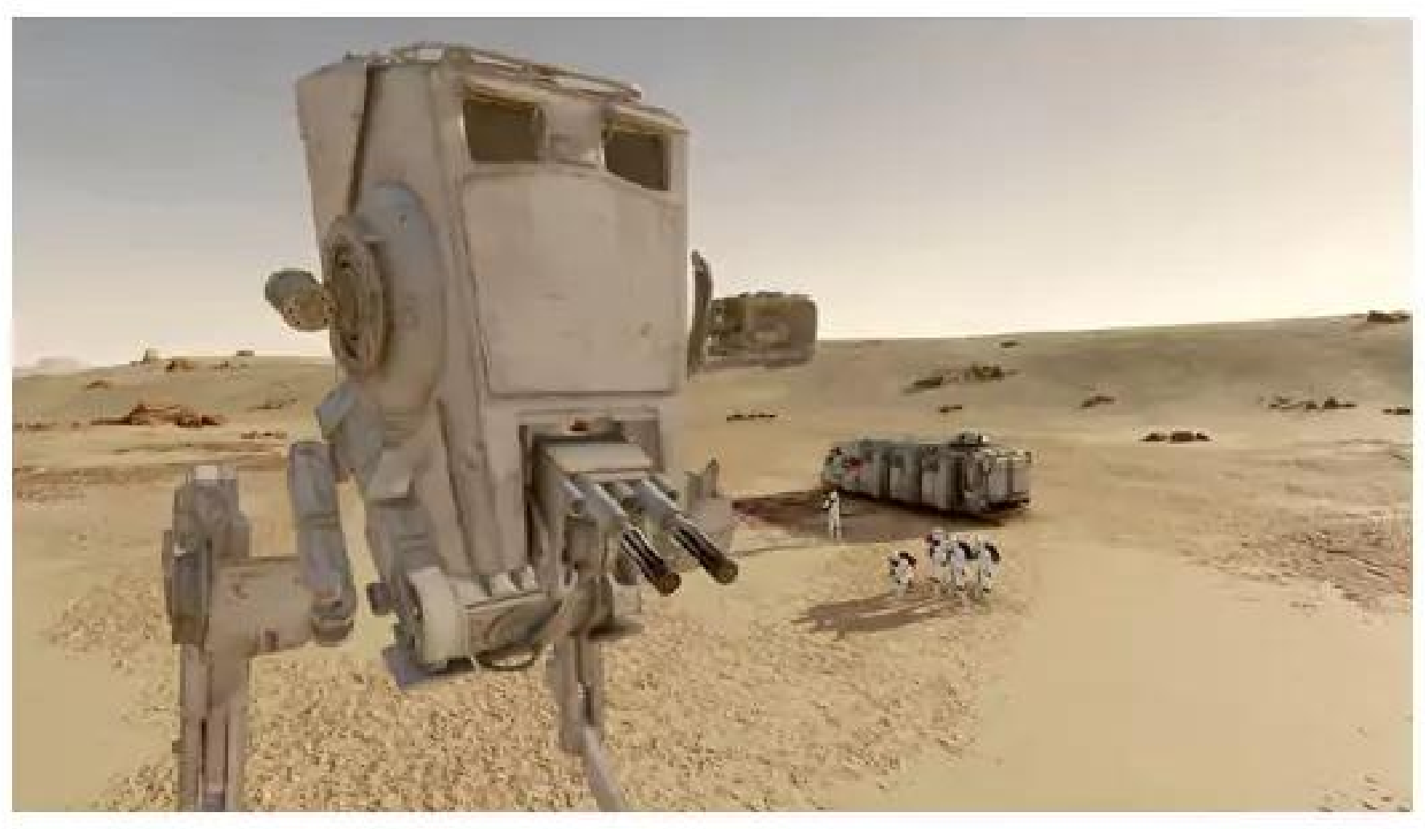
A complete overhaul of *Stellaris*, set in the time period following *Revenge of the Sith* and the start of the Galactic Civil War.

**GALACTIC CONTENTION**

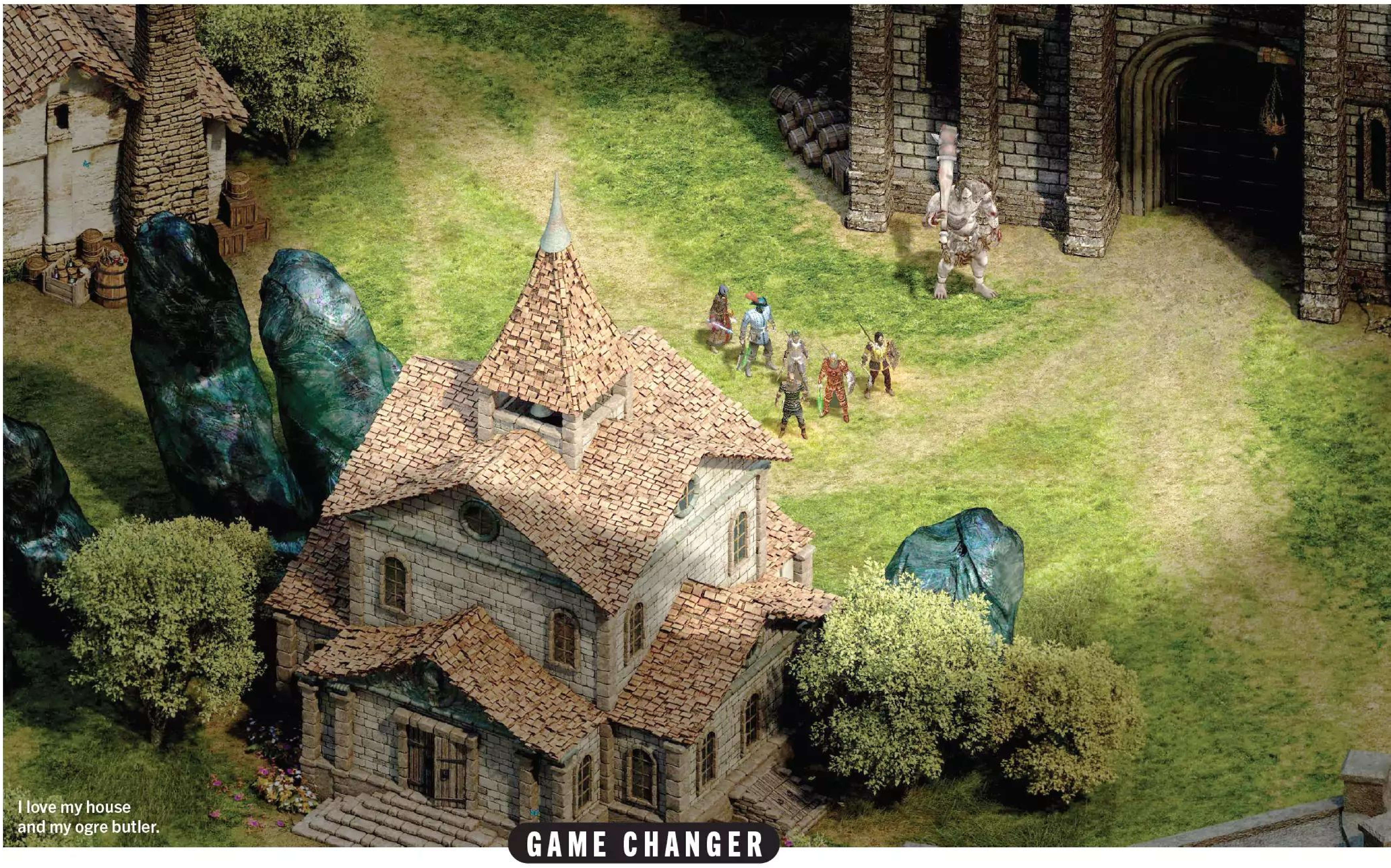
With more than 20 maps, 150 units, and 25 vehicles, this mod converts the military FPS Squad into a blast of a *Star Wars* shooter.







**TOP: Join the Imperial Navy, fly a TIE Fighter, and be a stormtrooper.**



I love my house and my ogre butler.

GAME CHANGER

**RELEASE** 2015 **DEVELOPER** Obsidian **PUBLISHER** Paradox **WEB** store.steampowered.com

# Pillars of Eternity

## Finally getting good at the Obsidian classic after 250 hours.

**Ted Litchfield**

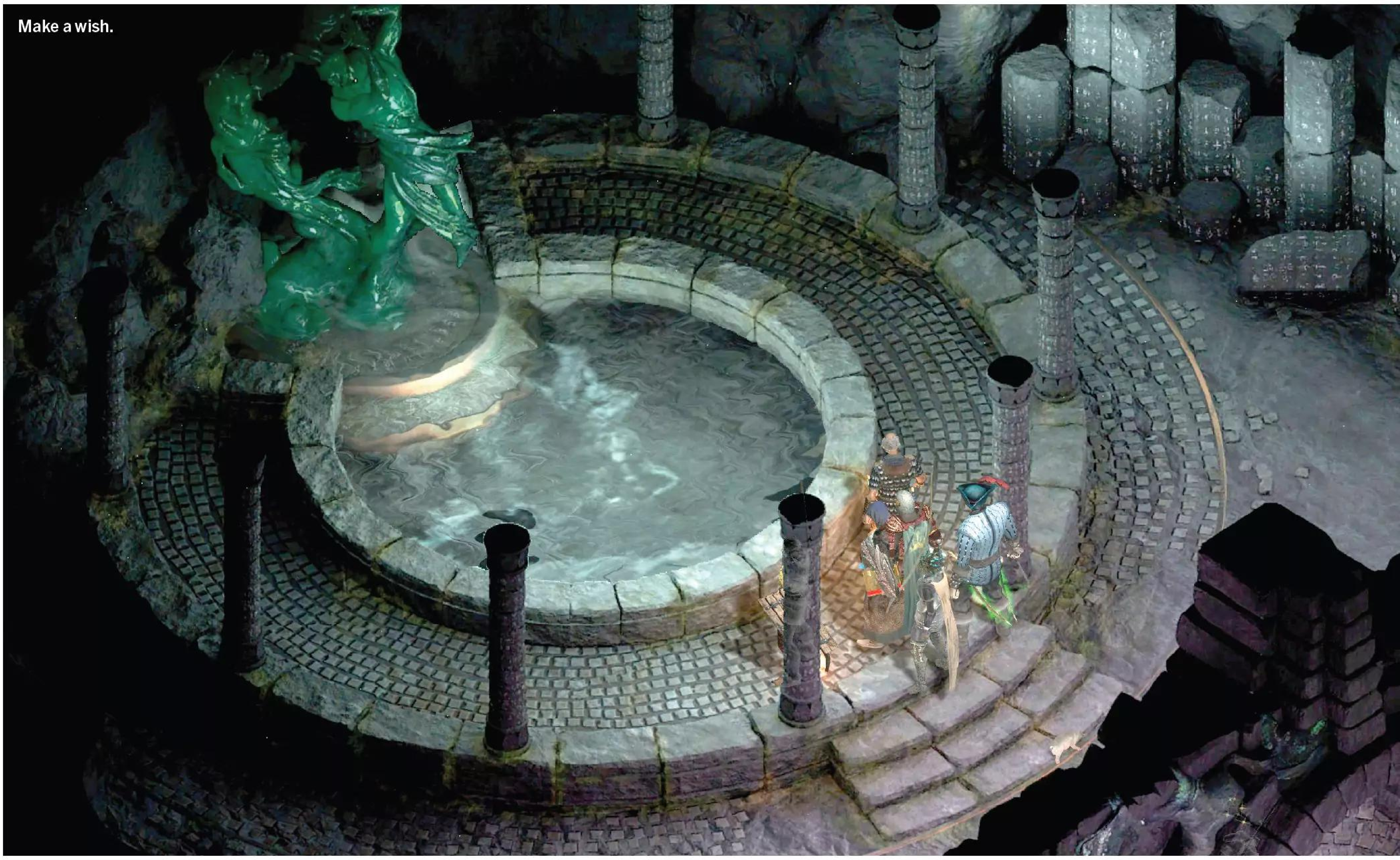
**They've started calling me the Stoic Gamer on account of how often I respond to tense situations, even crucial moments of my life with the dialogue option '[Stoic] Stay Silent'. Maybe not the best move in every circumstance, but *Pillars of Eternity's* personal reputation system has made it one of very few RPGs where I ever roleplay something other than A Nice Guy Who's Funny Sometimes – me in real life, but also a magical orc.**

I was a Kickstarter backer on *Pillars* all the way back in 2012 when it was Obsidian's Hail Mary to stay afloat as a company, then titled Project Eternity. You can take that as my social media era admission of a conflict of interest, but truth is, I found my investment resulted in a game that was hard to love on its 2015 release. *Pillars of Eternity* is brainy, dry, esoteric, and in possession of some of the most complex, high skill-ceiling mechanics I've seen in an RPG. I was immediately won over by its gorgeous visuals and unique atmosphere at launch, but it's taken multiple playthroughs, 250+ hours, and me putting the finishing touches to my adult brain after the age of 25 to fully appreciate everything going on thematically and mechanically in *Pillars of Eternity*.

### CIPHER SUPREMACY

The first part of a *Pillars* replay for me has always been a wiki and forum deep dive, setting up various builds and selecting weapons before once again making a Cipher, a class unique to *Pillars of Eternity* and one of my favourites in any RPG. Ciphers are characterised as psychic detectives, operatives who blend psionic powers with the utility and flexibility of a Rogue. As fits the theme, their spells focus on mental effects, nontraditional area of effect shapes, and a helpful avoidance of friendly fire. Some of my go-tos include Whispers of Treason, a cheap charm spell, Mental Binding, a powerful paralyse, and Psychovampiric Shield, which lowers an enemy's defences to improve your own.

But Ciphers actually begin fights with only a minimal amount of Focus, their class-appropriate spellcasting juice. You generate Focus by attacking enemies with weapons, a Soul Whip effect improving your damage while siphoning power from enemies. This lends Ciphers a unique rhythm, using weapon DPS to build



Make a wish.

up to powerful spellcasting effects.

Coupled with their theming as spies or investigators, Ciphers have this incredible class fantasy, as well as one of the best mechanical realisations I've ever seen of a Mage-Thief archetype. I just can't bring myself to play as another class in Pillars, even as its versions of the Paladin, Monk and Bard (Chanter) stand out as particularly inspired in their own right – thankfully the sequel added multiclassing to help me branch out.

I did mix things up a bit this time, though, opting for a build with dual sabres for melee DPS, and a blunderbuss for opening fights with ranged burst damage on enemy back row targets like mages. Going melee mode as a Cipher has been a revelation: not only is it just more fun to get in the middle of the action instead of standing back and plinking with a bow like I used to, the high damage of sabres is actually letting me build more Focus to get my spells off at a faster rate than ever before.

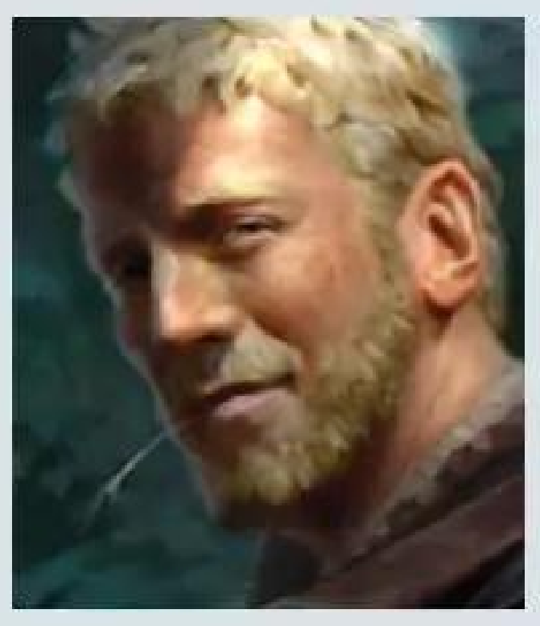
## HARD TIMES

Which is good, because I've finally bumped the difficulty up from Normal to Hard after ten years of playing and replaying this game. Even compared to hardcore classics like the OG *Baldur's Gate* it's based on, *Pillars'* tangle of resistances, immunities, and status effects, all filtered through the often difficult to parse jumble of real time with pause combat, has left it one of the most challenging RPGs I've ever played.

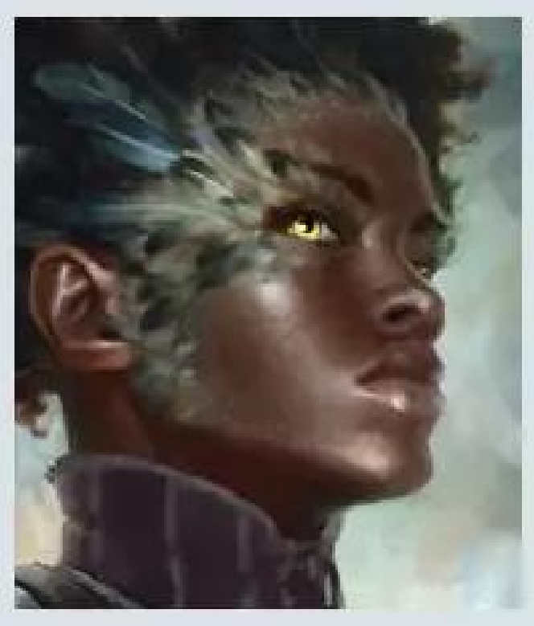
I feel like I've finally gotten a grip on all of that – I might even be ready for the max-difficulty Path of the Damned next time around – and I'm just so impressed with how elegant *Pillars'* systems really are. It turns out I always had the tools to deal with the fights that gave me the most grief, I just wasn't paying enough attention.

Companion Wizard Aloth can quickly access AOE confusion and blindness spells that are the key to winning difficult group encounters early on. My Cipher, meanwhile, is a Swiss army knife for dealing with the game's challenges: Charming enemy bruisers or even full-on bosses has trivialised fights that ruined me on easy mode ten years ago, while I was always supposed to channel my frustration at getting paralysed all the time into paralysing spam of my own. When I

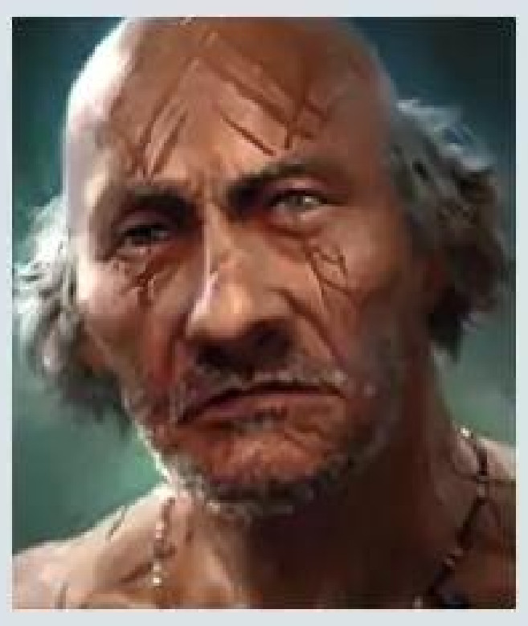
## PARTY POLITICS *Pillars' cast doesn't get enough credit*



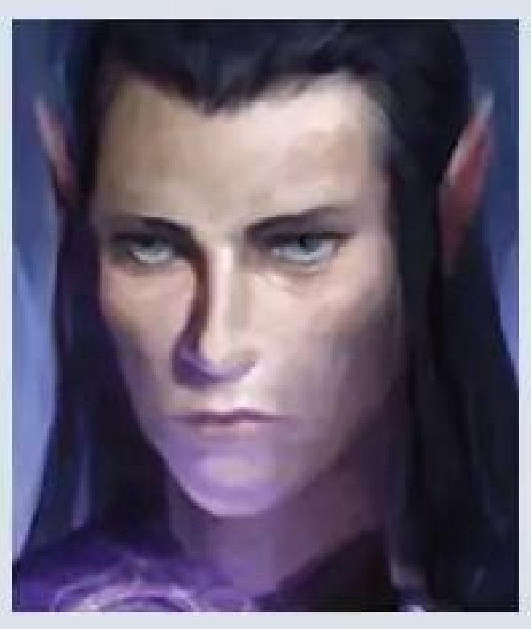
**EDÉR**
Lovable farm boy. Tied with Aveline in *Dragon Age 2* as the best tank in gaming history.



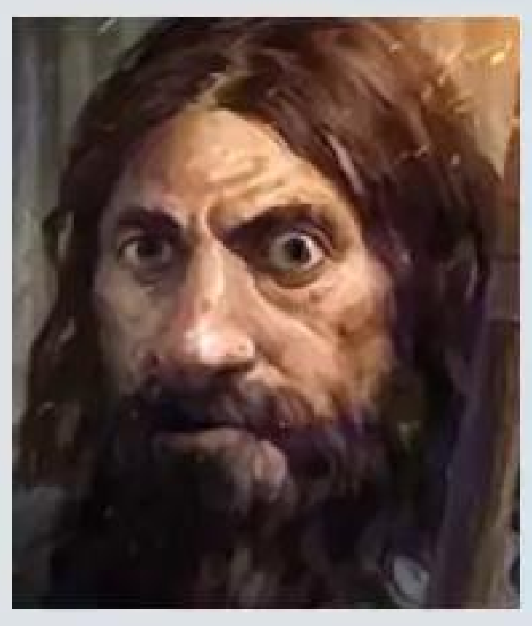
**PALLEGINA**
Avian paladin with a prickly demeanor. Can smite with guns as well as with swords.



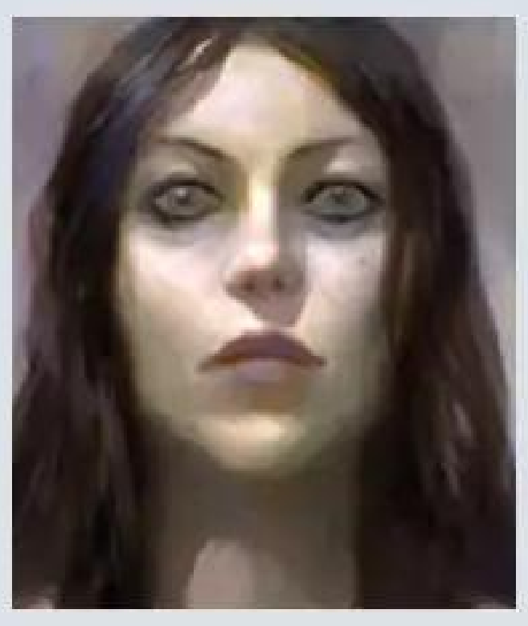
**ZAHUA**
Stoner monk with an achingly tragic backstory and some of my favourite dialogue ever.



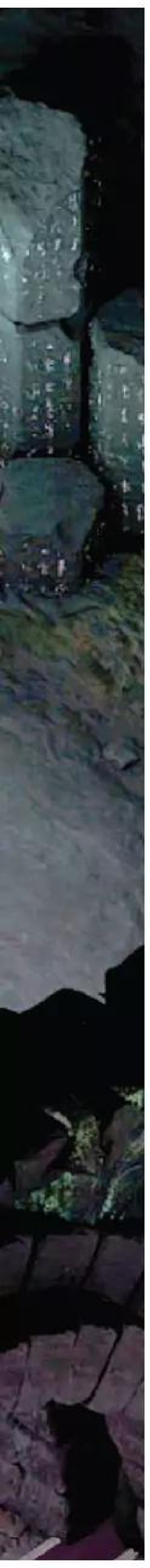
**ALOTH**
Shares a brain with an ancient peasant woman with a foul mouth. The two could talk more.

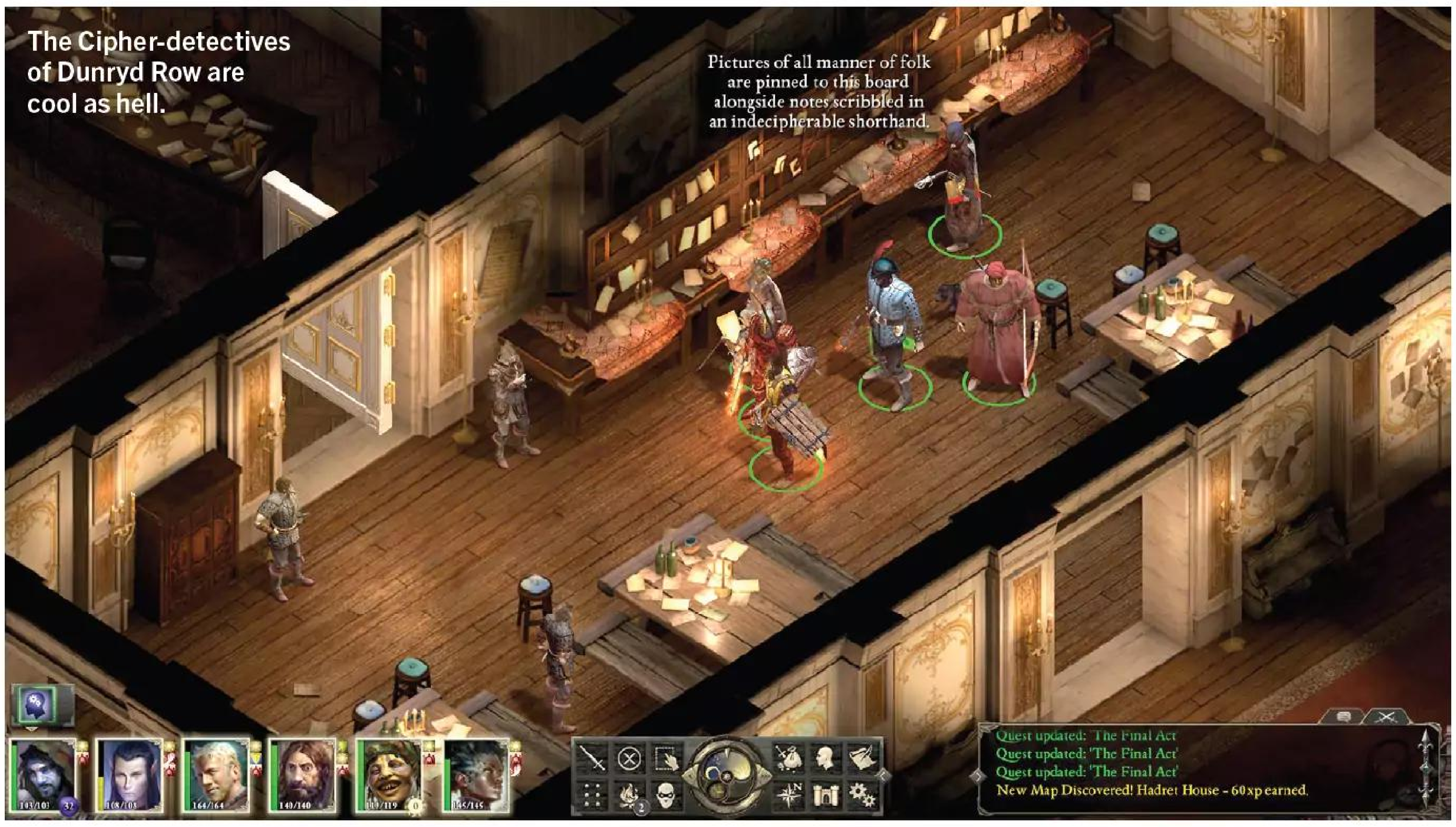


**DURANCE**
Kreia from *KotOR 2*, but also Rasputin. A human male priest and healer. Problematic fav.



**GRIEVING MOTHER**
A Cipher, that's the closest word. Comes with another achingly tragic backstory.





The Cipher-detectives of Dunryd Row are cool as hell.

Pictures of all manner of folk are pinned to this board alongside notes scribbled in an indecipherable shorthand.

Quest updated: 'The Final Act'
Quest updated: 'The Final Act'
Quest updated: 'The Final Act'
New Map Discovered! Hadret House - 60xp earned.

**ABOVE:** Every dungeon needs some ambience.

**RIGHT:** These machines are tied to an ancient conspiracy.

GAME PAUSED

Zahua engaged Sporeling in melee.
Durance activates Bash.
Durance (Bash) hits Sporeling for 2 Crush damage.

struggled with accuracy against enemies, I was always able to debuff them into submission. *Pillars* was challenging to me because I didn't understand it. Now that I've achieved a level of mastery, it's firmly one of my favourite RPGs. *Pillars of Eternity* is a rare game that I've loved more with each playthrough.

## STRANGE SHORES

*Pillars'* sequel, *Deadfire*, rightly gets a lot of praise for its portrayal of colonialism, telling a story that's politically and historically grounded without being ham-fisted. But I've always thought the first game never gets its flowers in this regard: *Pillars of Eternity* is smart fantasy, and every time I've seen a reviewer call it generic or Tolkeinesque, I've died a little bit inside.

Eora is more firmly rooted in a specific era and its technology than many fantasy settings, closer to *A Song of Ice and Fire* than *The Forgotten Realms*, but with the early modern period, rather than medieval times. The look of it all, meanwhile, is so thoroughly *Pillars*, and it's not just the gorgeous pre-rendered backgrounds that have aged better than many of its contemporaries. The art of *Pillars* is simultaneously grounded, historical and realistic, but also vibrant and dreamlike: you'll be in a thatched roof Baldur's Berg one minute then find yourself exploring an ancient city of living rock the next.

Meanwhile, Deadfire's handling of colonialism was presaged by themes in the first game. The setting of the Dyrwood feels like a fantasy counterpart to early America, with a similar mythology of freedom, individualism and revolution against a distant monarch belied by the dispossession of a native people. It makes for a fascinating, complicated setting, unique in the field of CRPGs.

## WHEEL OF REBIRTH

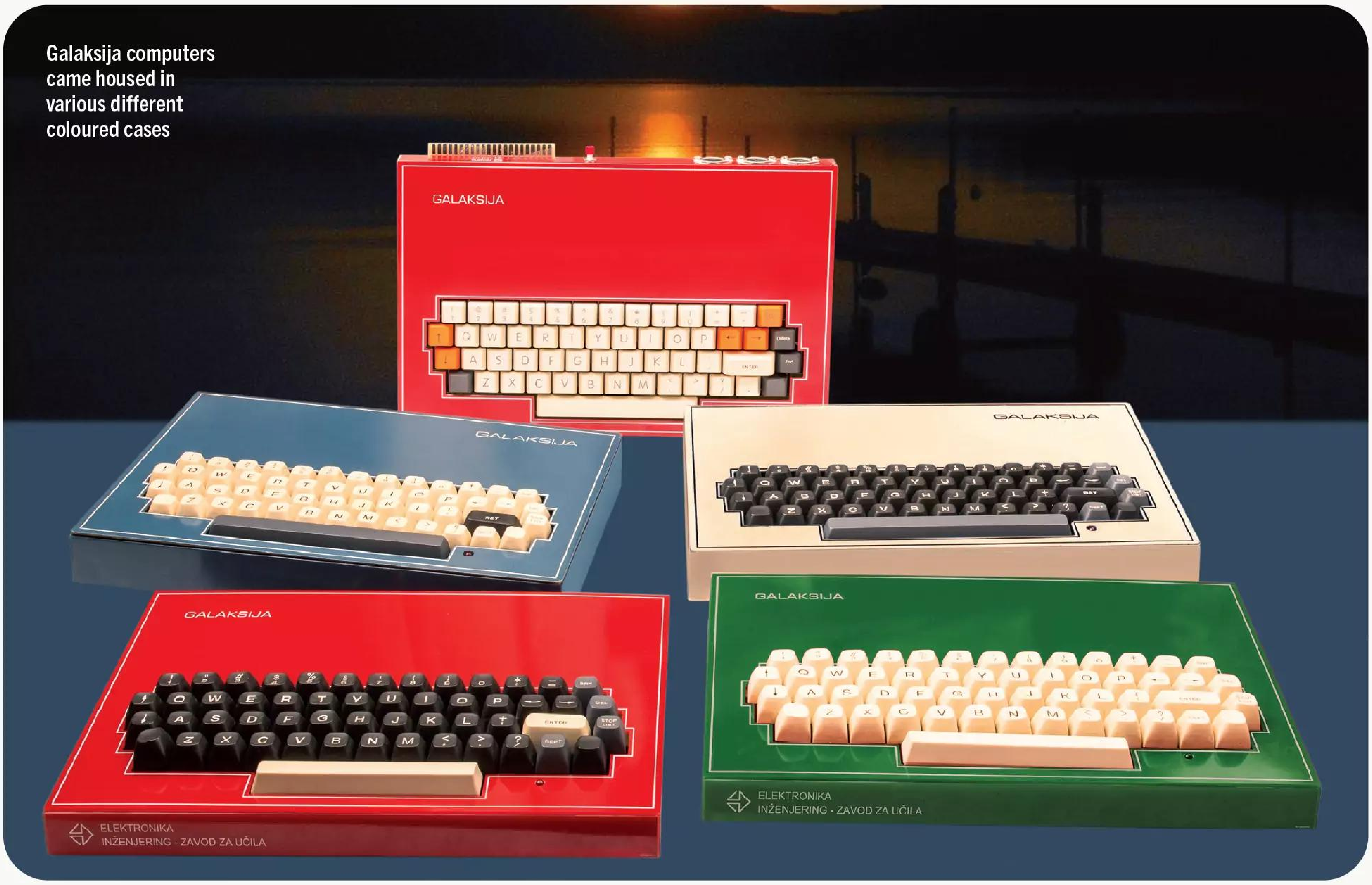
I'm about 30 hours into my playthrough at the time of writing, with a ton of game still left to chew through. The addition of The White March expansion increases *Pillars'* runtime by at least a third, and while an essential part of the game, its marathon length has me contemplating a mid-campaign break before coming back with fresh eyes. But still, I think I'll be able to slip back into the role of my Stoic Cipher like a favourite pair of jeans.

Down the line? I'll be continuing his adventures into Deadfire. I've got my eye on a pretty gnarly-looking Rogue/Cipher multiclass build to continue that glass cannon, DPS/crowd control playstyle I've become so smitten with. I may finally dabble with Deadfire's turn based combat mode, an experimental addition I should prefer by default, but that's never seemed to have been as widely embraced by the community. A similar turn-based update is set to come to the first game later this year.

Zooming out further, the future of Eora seems brighter than it's been in a hot minute thanks to the apparent success of *Avowed*, but we're far more likely to see the continuation of that first person spinoff than another entry in the tactical, isometric series it was based on. If you'd asked me ten years ago, I probably would have preferred *Avowed* to *Pillars of Eternity*. These days? Give me crunch, complexity and Cipher paralyse spam every time. ■

# RETRO

Inspirational stories from computing's long-distant past



Galaksija computers came housed in various different coloured cases

# The legend behind Yugoslavia's DIY computer

David Crookes interviews Voja Antonić, the man whose recipe for a home-made computer – the Galaksija – inspired a generation in former Yugoslavia.

**It was December 1983, and Belgrade in former Yugoslavia was suffering a typically harsh winter. Temperatures had plummeted to as low as -10°C. Yet something happened that month which would warm the hearts of thousands of technology enthusiasts: a special edition of a popular science magazine hit the**

The publication, *Računari u vašoj kući* (Computers in Your Home), was released as a spin-off of the monthly magazine *Galaksija* and it was notable for two things. One, it was the first computer magazine to be released in the country. Two, it instructed readers how to build their own computer. What's more, it became as influential in Eastern Europe as the ZX Spectrum and Commodore 64 were in the West. What began as a small project became a phenomenon.

The concept of this particular DIY build was envisioned by Voja Antonić, who fell in love with technology from a young age. He began to enjoy HAM radio in the 1970s and got as far as passing exams, earning a licence and getting a call sign. He also became interested in digital technology.

"I was in elementary school when I bought my first transistors with my pocket money," he told *APC*. "They were germanium types AC540, the equivalent of Philips' OC70, and, while I didn't know the theory, I knew I could build digital circuits."

Antonić certainly loved to play around, making his own discoveries. "One base resistor and one collector load and I had the inverter – I 'invented' the flip-flop not knowing that it had been used for decades," he said. He later used a microprocessor to create a Conway's Game of Life machine. But his ambitions were hampered by Communist restrictions, which meant that he needed to be creative in his desire to pursue his hobby.

## BORN FROM NECESSITY

In the late 1970s, home computing was beginning to flourish across Western Europe. Apple impressed with the Apple II and Atari released the 400 and 800, but tech enthusiasts in Yugoslavia couldn't buy such machines. "Computing was not limited but you couldn't import anything

Voja Antonić: Geologicharka

over 50 Deutsch Marks. It meant you couldn't get even the cheapest computer on the market," Antonić said, believing such restrictions were leaving people in his country many years behind.

There were means, however. "You had the choice of smuggling one into the country or building your own," Antonić said. So he effectively did both. He asked a friend in the US to break up a new TRS-80 Model I microcomputer in 1977 and have it sent to him in pieces in multiple packages, labelled as "technical junk".

When Antonić received all of the packages he rebuilt the machine, thereby getting around the restrictions. Years went by as enthusiasts continued to resort to smuggling, bribing and coming up with innovative and creative ways to get kit into the country. Many became accomplished engineers and programmers in the process, with Antonić himself becoming adept at creating computers and developing software from scratch. But there was a widespread feeling of frustration.

Antonić, like many others, was hearing about new machines being released in the West and he was envious of their capabilities. The ZX Spectrum, for example, had a custom chip called the ULA (Uncommitted Logic Array) which could, among other things, generate a display with the assistance of a UHF modulator.

When producing his own computer, he knew he wouldn't be able to add a ULA so he came up with an alternative plan. He figured he could use part of a Z80 microprocessor to generate the fastest portion of a video signal, allowing software to generate the slower portion. This would allow him to produce a computer without a graphics chip, even though he knew it would sacrifice processing power.

Once he got that aspect of his computer working, he was able to work on producing an operating system, as well as a line editor and BASIC interpreter.

"I produced something that was well optimised and simple to build," Antonić said. "Yes, it was slow with only 4K of operating system and 6K of RAM. It also had 16 x 32 text and very poor graphics (64 x 48), but it was still a computer."

**ABOVE** Voja Antonić's work in the Socialist Federal Republic of Yugoslavia was ground-breaking.

Wikimedia Commons, CC BY-SA 3.0

## BLUEPRINTS FOR A GENERATION

Antonić decided the computer was too good to keep to himself. "I thought there might be others who would want to build it too so I wanted to offer it to a magazine," he said. He considered approaching SAM Magazine in Zagreb, believing his prototype computer would be of interest to its readers. But a mutual friend put him in touch with journalist and computer programmer Dejan Ristanović, who had just happened to pen a piece about general computing for Galaksija magazine.

As luck would have it, following the publication of his computing article, Ristanović had been asked to oversee a 100-page special edition called "Računari u vašoj kući", and he was looking for interesting ideas. Such as Antonić's machine. The idea was to devote a reasonably large number of pages to the computer, showing readers exactly what they needed to do to build their own version.

Antonić had five months to tweak and perfect the build. During that time, he finalised the firmware and worked hard to

"He figured he could use part of a Z80 microprocessor to generate the fastest portion of a video signal, allowing software to generate the slower portion. This would allow him to produce a computer without a graphics chip, even though he knew it would sacrifice processing power."

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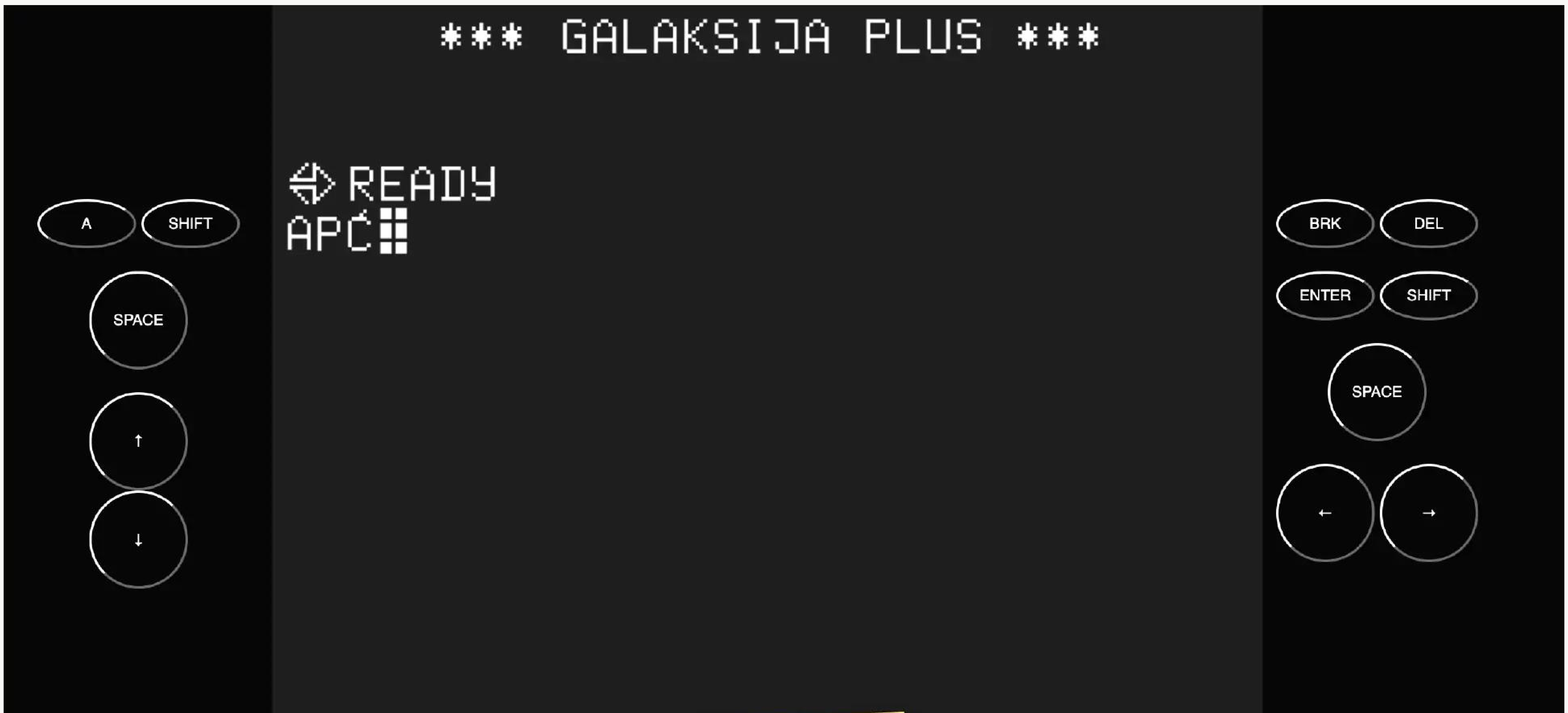

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*** GALAKSIJA PLUS ***

READY
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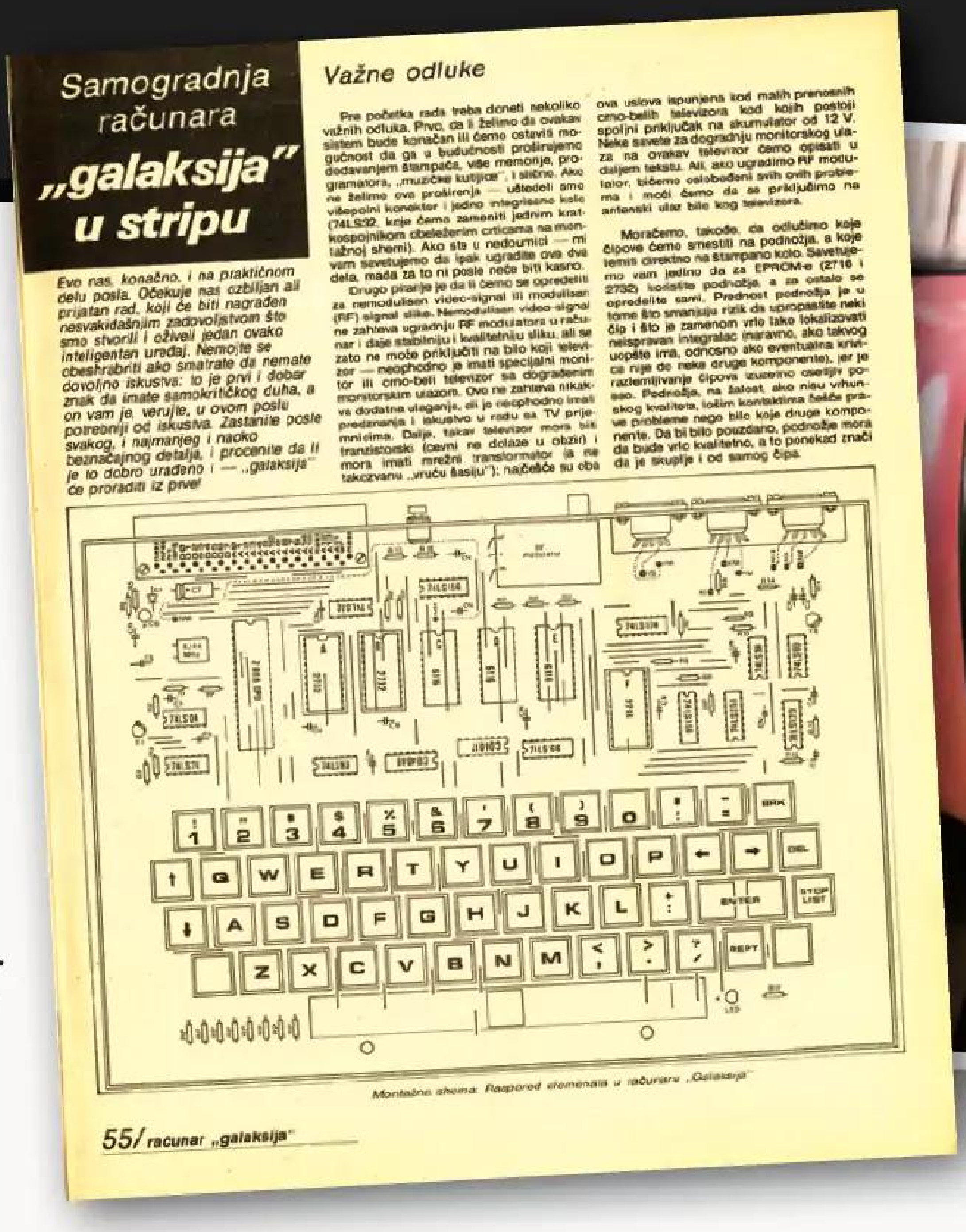


Samogradnja računara

„galaksija" u stripu

*Evo nas, konačno, i na praktičnom delu posla. Očekuje nas ozbiljan ali prijatan rad, koji će biti nagrađen nesvakidašnjim zadovoljstvom što smo stvorili i oživeli jedan ovako inteligentan uređaj. Nemojte se obeshrabriti ako smatrate da nemate dovoljno iskustva: to je prvi i dobar znak da imate samokritičkog duha, a on vam je, verujte, u ovom poslu potrebniji od iskustva. Zastanite posle svakog, i najmanjeg i naoko beznačajnog detalja, i procenite da li je to dobro urađeno i — „galaksija" će proraditi iz prve!*

*Važne odluke*

Pre početka rada treba doneti nekoliko važnih odluka. Prvo, da li želimo da ovakav sistem bude konačan ili ćemo ostaviti mogućnost da ga u budućnosti proširujemo dodavanjem štampača, više memorije, programatora, „muzičke kutijice", i slično. Ako ne želimo ova proširenja — uštedeli smo višepolni konektor i jedno integrisano kolo (74LS32, koje ćemo zameniti jednim kratkospojnikom obeleženim crticama na montažnoj shemi). Ako ste u nedoumici — mi vam savetujemo da ipak ugradite ova dva dela, mada za to ni posle neće biti kasno.

Drugo pitanje je da li ćemo se opredeliti za nemodulisan video-signal ili modulisan (RF) signal slike. Nemodulisan video-signal ne zahteva ugradnju RF modulatora u računar i daje stabilniju i kvalitetniju sliku, ali se zato ne može priključiti na bilo koji televizor — neophodno je imati specijalni monitor ili crno-beli televizor sa dograđenim monitorskim ulazom. Ovo ne zahteva nikakva dodatna ulaganja, ali je neophodno imati predznanja i iskustva u radu sa TV prijemnicima. Dalje, takav televizor mora biti tranzistorski (cevni ne dolaze u obzir) i mora imati mrežni transformator (a ne takozvanu „vruću šasiju"); najčešće su oba ova uslova ispunjena kod malih prenosnih crno-belih televizora kod kojih postoji spoljni priključak na akumulator od 12 V. Neke savete za dogradnju monitorskog ulaza na ovakav televizor ćemo opisati u daljem tekstu. Ali, ako ugradimo RF modulator, bićemo oslobođeni svih ovih problema i moći ćemo da se priključimo na antenski ulaz bilo kog televizora.

Moraćemo, takođe, da odlučimo koje čipove ćemo smestiti na podnožja, a koje lemiti direktno na štampano kolo. Savetujemo vam jedino da za EPROM-e (2716 i 2732) koristite podnožja, a za ostalo se opredelite sami. Prednost podnožja je u tome što smanjuju rizik da upropastite neki čip i što je zamenom vrlo lako lokalizovati neispravan integralac (naravno, ako takvog uopšte ima, odnosno ako eventualna krivica nije do neke druge komponente), jer je razlemljivanje čipova izuzetno osetljiv posao. Podnožja, na žalost, ako nisu vrhunskog kvaliteta, lošim kontaktima češće prave probleme nego bilo koje druge komponente. Da bi bilo pouzdano, podnožje mora da bude vrlo kvalitetno, a to ponekad znači da je skuplje i od samog čipa.

Montažna shema: Raspored elemenata u računaru „Galaksija"

55/ računar „galaksija"

ensure it could be squeezed into the desired 4KB of EPROM space. At no stage did he pretend his design could rival Western machines. That wasn't the point. But he was excited at the prospect of introducing scores of people to computing, giving them a taste of what many outside of Eastern Europe were enjoying.

"The computer's performance was extremely poor, but the ease of assembly and the price were good enough to motivate you to build one," Antonić said. "The design philosophy was also simple: a computer made by your own hands. Once I'd offered it to the magazine, everything else was a coincidence: the fact it was a good moment to start something like that and the fact there were two good guys – Dejan Ristanović and Jova Regasek [*Galaksija*'s editor] who took action and published the DIY project."

Crucial to the project was availability. The computer – which was also called Galaksija ("Galaxy" in English) – could be created in its entirety using easily obtainable parts, and that made it both legal and attractive. The article told readers where they could get the components from – whether that was in a store, via mail order or from suppliers abroad – and they were able to mail their EPROMs to be loaded with the OS.

Since Antonić sought to use as few components as possible, readers didn't have to spend too much time finding parts, and it meant the computer was also affordable. "The software-assisted video saved a lot of integrated circuits – counters, selectors and buffers – so the whole project only had 14 basic chips around the processor and memory," he said. "This came at the cost of slowing down the computer to only 25% of its initial computing power, but no-one cared."

## THE PEOPLE'S COMPUTER

Just before publication, Regasek was curious. He asked Antonić how many readers he believed would actually take the time to build it. "Even when the whole article was ready for print, with

**TOP** You can play Russian favourite *Tetris* online in a Galaksija emulator.

**ABOVE LEFT** Pages from the magazine with instructions on how to build the Galaksija.

**ABOVE RIGHT** The Galaksija introduced lots of young people to the delights of computing.

lots of photos and 16 pages of text in the magazine, my guess was about 50 successfully built pieces," Antonić said. "Dejan estimated about 200 and Jova about 500." All of them were wrong.

The article was hugely popular, so much so that the magazine quickly sold out. It needed to be reprinted, but those copies sold out too. Regasek ordered a second reprint, then a third, and then a fourth. *Galaksija* magazine sold 30,000 copies but Računari u vašoj kući ended up selling more. Four times more.

"After a very short time, we had more than 8,000 letters from enthusiasts who built it, so there must have been more than 10,000 built across the country," said Antonić. It was nothing short of a triumph and it helped to spark a computer revolution that would, in many respects, rival that of the BBC Micro in the UK. Suddenly, people were able to see the potential of computers. For many, it felt liberating.

“People were ready to embrace computing as a new era, and that was the main reason for its success: a lucky moment to start a DIY project,” Antonić said. It also started a cottage industry of sorts. “You didn’t have to wait long before smugglers started offering complete kits with printed circuit boards and even programmed EPROMs, which meant problems with some supplies were automatically solved,” he added.

Most kits wouldn’t come with a keyboard or a case. Users would have to provide their own, which meant that Galaksija machines took on unique identities. People would be creative and innovative, decorating their computers to suit their own personalities. This meant that the Galaksija computer felt hi-tech yet primitive at the same time, and it likely helped to demystify the machines.

There was also plenty of software. Users would load and save from cassette tape – a potentially painful experience as many readers will know. But it made copying easier, and the aim was to encourage people to share their creations rather than seek to profit from them.

One way people could obtain software was to tune into the state-owned Radio Beograd 202, which broadcast from Belgrade. If you ever remember taping your favourite Top 40 songs at home, then the concept was similar: a radio host called Zoran Modli would broadcast computer software on his Ventilator 202 show and people would record them to play on their Galaksija. Hundreds of apps were distributed this way, and enthusiasts would send their own programs to Modli. There were many games.

The fun wasn’t to last, however. Although an improved version called Galaksija Plus was created by Nenad Dunjić in 1985 with an enhanced 256 x 208 monochrome display, 48KB RAM and three-voice sound, the excitement around Galaksija began to fade. It had made its way in to homes and some schools and universities, but other, more important, things began occupying people’s minds.

“There was a political crisis with extreme nationalists in the government, then came the war and mass protests, even NATO bombing of major cities in Serbia. There wasn’t much room for such projects,” Antonić said.

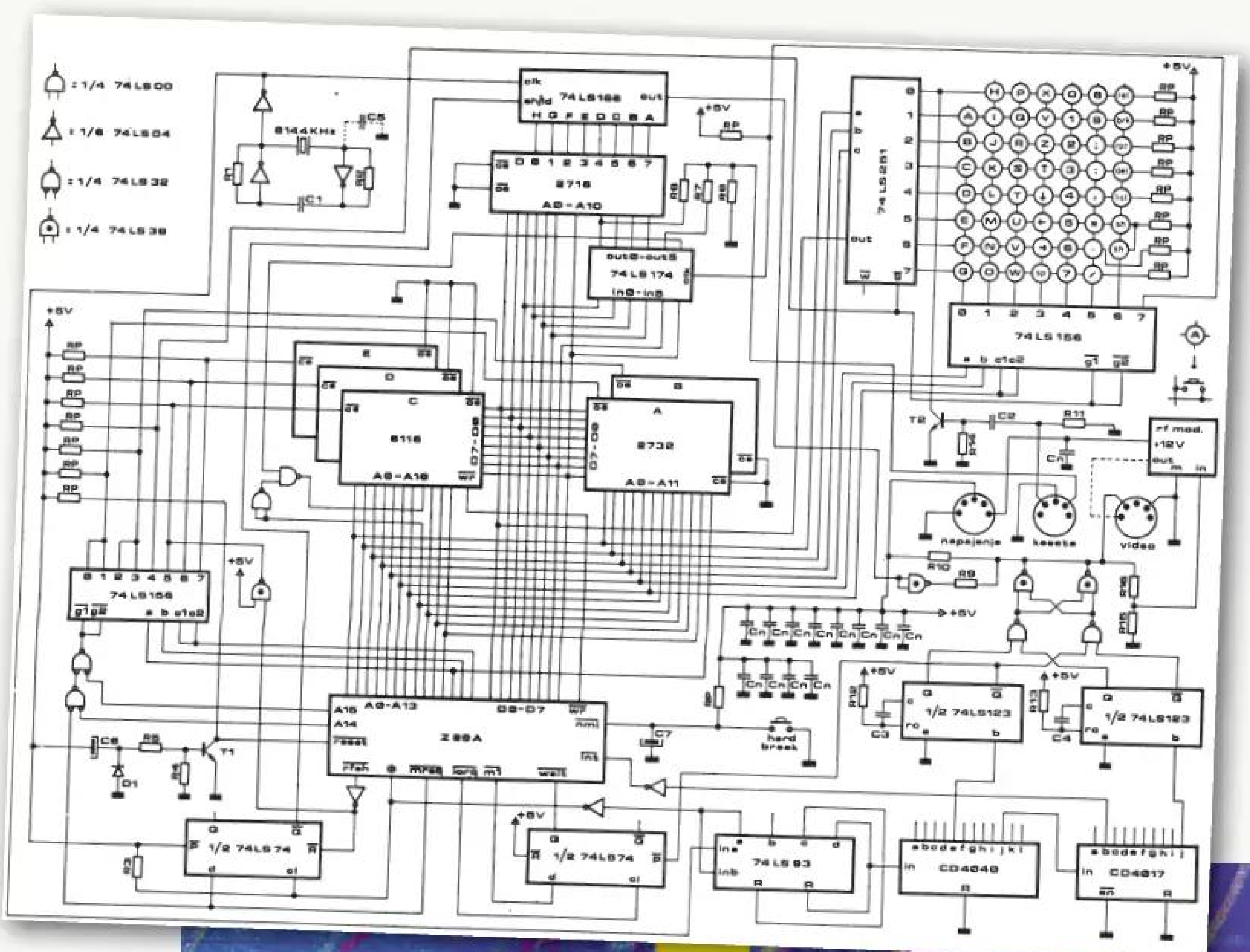
## A SECOND LIFE

For a time, Galaksija was even derided, especially after Western machines eventually made it into Yugoslavia’s domestic market. “There was a moment, especially during the war in 1990s, when Galaksija was followed by a bad connotation,” Antonić said. “You could read the jokes about it, mostly based on the modest performance of the hardware. But somehow everything changed after the turn of the century. I don’t think that I can explain it.”

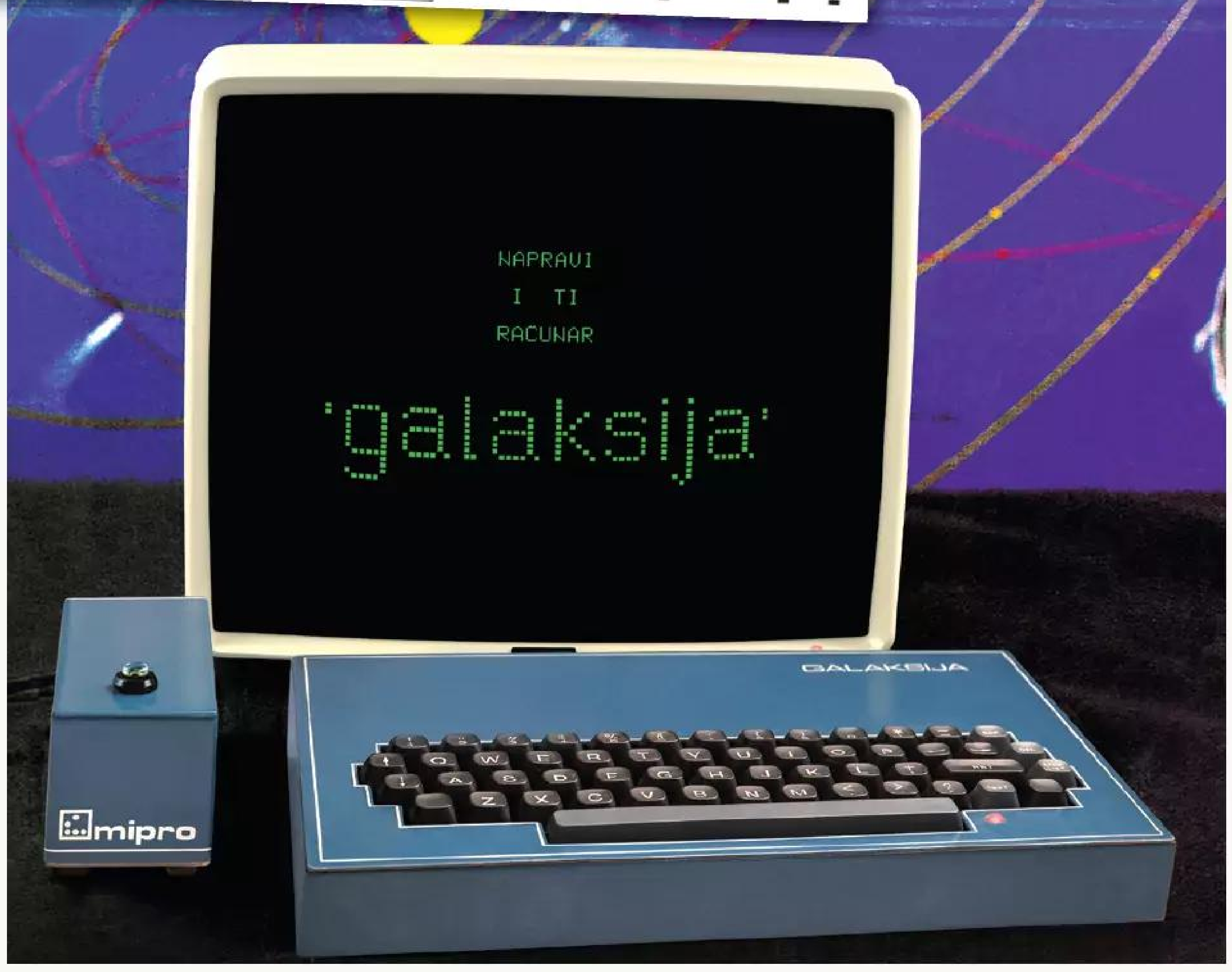
Call it nostalgia or simply a recognition of the Galaksija’s true worth, but the computer found a second wind. In some respects, its story mirrored what happened in the West: old machines were cast aside in favour of new ones, only for some people to later return to them with fondness, leading to a flourishing retro scene.

“The new century began with a rebirth of technical enthusiasm. People suddenly became interested in the history of computing,” Antonić said. “Soon I got calls from several museums to donate copies of Galaksija.” He also learned that the project helped to seed a generation of developers, engineers and makers across what is today Slovenia, Croatia, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia and Kosovo.

**BELOW** Galaksija’s circuit diagram was printed in the magazine for readers to follow.



**BOTTOM** This image was used on the cover of the January 1984 issue of the magazine.



Voja Antonić

“I still get emails from people all over the world, mostly from guys from the former Yugoslavia,” Antonić said. “They told me that I had determined their future, because their experience building the Galaksija encouraged them to continue studying digital hardware and software.”

Even those who didn’t forge a career in computing remember the Galaksija with fondness. “When I’m in Belgrade, there are people who stop me on the street to share a few words with me about those days,” Antonić said.

Yet even though he helped shape the future of computing in former Yugoslavia, Antonić wishes today’s industry reflected more deeply on its origins. For while he looks back with great fondness on those early days and acknowledges the progress made, there’s also a desire to return to simpler times.

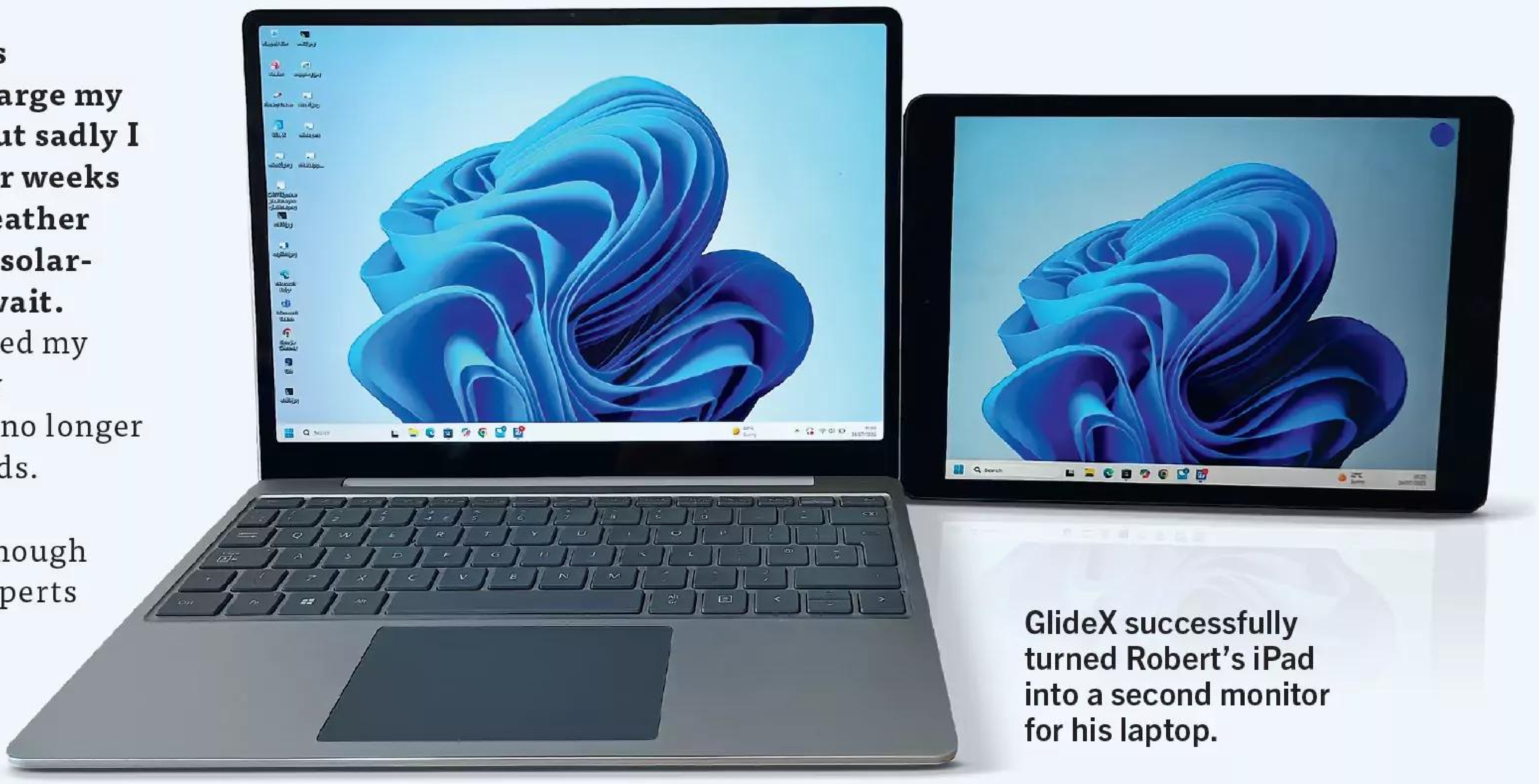
“Today’s games are fascinating, but they are also too different from the old ones,” he said. “I wish they could replicate the charm and beauty of the old 2D computer games.” But it’s no surprise. If anyone can remind us that even the simplest sparks of curiosity can change lives, few serve as a better example than Voja Antonić. ■

# KNOW HOW

Looking for a cheap way to expand his screen space,

**Robert Irvine** tries to...

# Turn an old tablet into a monitor



GlideX successfully turned Robert's iPad into a second monitor for his laptop.

**In this issue's column I was supposed to be trying to charge my phone using solar power, but sadly I got the timing wrong. After weeks of blazing sunshine, the weather has turned overcast, so my solar-charging test will have to wait.**

In the meantime, I've turned my attention to the screen of my Windows 11 laptop, which is no longer fulfilling my workspace needs. Measuring a mere 13 inches diagonally, it doesn't offer enough 'screen real estate' (as the experts say) to display everything I want.

Aside from my browser, I usually have at least 10 programs, apps and folders open at any given time. Some are minimised to the taskbar while others lurk in the background, jostling for space.

The obvious solution is to buy a second monitor (my main one is being used by my desktop PC) and create a dual-screen setup that doubles the size of my desktop. But I don't have much physical desk space, and would rather spend my money on a bigger desk.

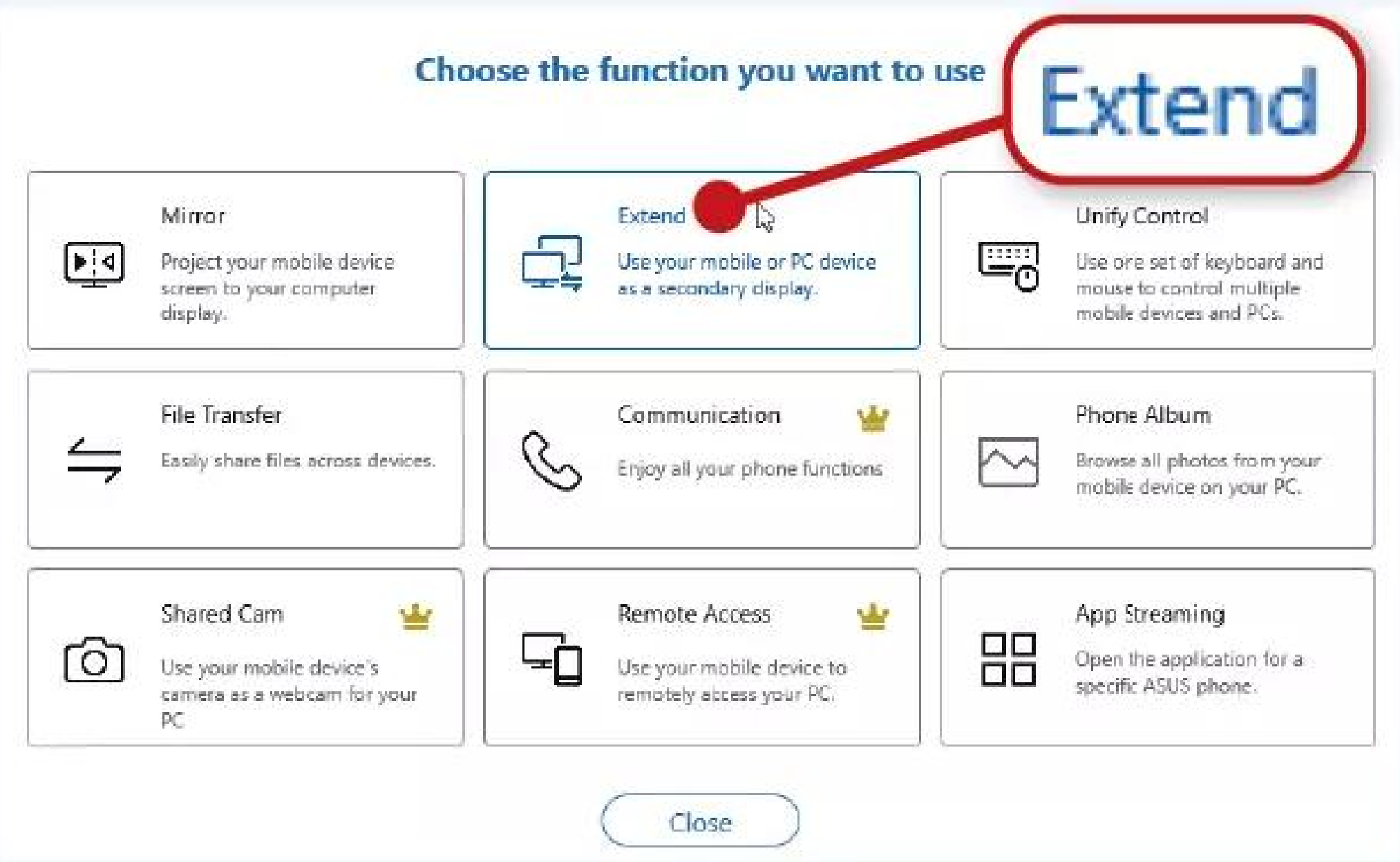
So I was excited to learn about a screen-sharing app called GlideX (**tinyurl.com/APC552glidex**), which – among other things – lets you turn any PC, phone or tablet into a second monitor. It's made by Asus but isn't limited to that company's monitors and is free to use with no apparent catches.

As my phone is too small to serve as a monitor, I figured the best device to use as a second screen would be my old iPad (eighth generation, released in 2020). This has a 10.2in high-resolution display and wasn't doing much aside from sitting in a drawer waiting for the next iOS update.

On my laptop, I installed the GlideX app from the Microsoft Store (**tinyurl.com/APC552glide**). Apart from asking me to choose between 'China service' and 'Global service' (Asus is Taiwanese), this was very straightforward, although the QR code for downloading the mobile app didn't work. Instead I installed GlideX on my iPad via the Apple App Store (**tinyurl.com/APC552glideio**) and allowed it to detect nearby devices.

In the Windows version, I clicked Start Now and selected Extend as the function I wanted to use (see screenshot below). GlideX then searched for devices on the same Wi-Fi network, found my iPad and sent it a request to extend the laptop's screen. I tapped Accept and, as if by magic, my iPad instantly displayed my Windows 11 desktop (pictured above). I hadn't even signed up for – or into – an account.

> "Rather than mirror my laptop (though that's also an option), GlideX had given me an extra desktop, almost doubling my available screen space."



Choose the function you want to use

| | | |
|---|---|---|
| Mirror<br>Project your mobile device screen to your computer display. | Extend<br>Use your mobile or PC device as a secondary display. | Unify Control<br>Use one set of keyboard and mouse to control multiple mobile devices and PCs. |
| File Transfer<br>Easily share files across devices. | Communication<br>Enjoy all your phone functions | Phone Album<br>Browse all photos from your mobile device on your PC. |
| Shared Cam<br>Use your mobile device's camera as a webcam for your PC | Remote Access<br>Use your mobile device to remotely access your PC. | App Streaming<br>Open the application for a specific ASUS phone. |

Extending your display in GlideX is surprisingly straightforward.

Rather than mirror my laptop (though that's also an option), GlideX had given me an extra desktop, almost doubling my available screen space. I was able to drag my cursor from one device to the other – either using my laptop's trackpad or the iPad's touchscreen – and easily move items between them.

This meant I could shift software and folder windows, and individual files, from my Windows 11 desktop to the extended iPad screen. I could also open and operate files and programs with my finger, rather than pointing and clicking. Cleverly, GlideX saves details of items you move to the second screen, so they're automatically restored after you disconnect and reconnect the devices.

I was very impressed by GlideX's simplicity, and by the fact you can use it for free without registering. Signing up for an Asus account unlocks extra features such as remote access, and lets you extend your screen to more than two devices. But I imagine that could get quite confusing, so a dual-desktop is enough for me. ■

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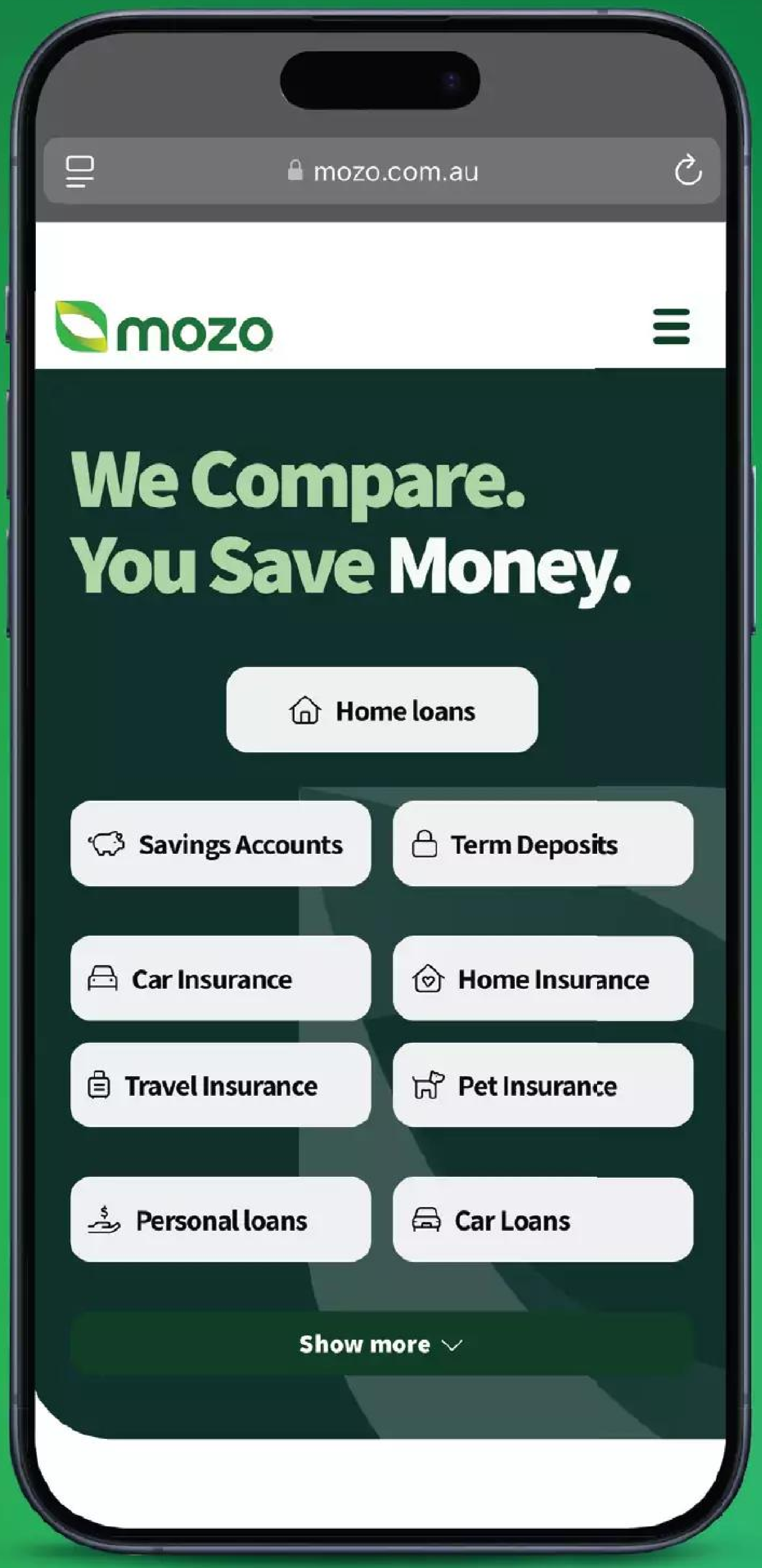
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